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Student Medicine

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Official Journal of the
American College Health Association

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Editorial Comment

DO YOU PRESCRIBE FOR YOUR PATIENTS?

HOW many physicians can answer with an unqualified affirmative response to the question: do you prescribe for your patients? Undoubtedly many cannot, or else the pharmaceutical manufacturers would not be mounting new promotional campaigns for the increasing numbers of "polypharmaceutical" preparations which are appearing. Some physicians must be treating their patients with these preparations of multiple-ingredient medications which Friend has described as "therapeutically unsound, or even stupidly contrived, but widely used substances." [1]

Physicians in ancient times relied on multiple-ingredient remedies, the most outstanding of which was mithridatium or theriac. It was composed of fifty-four ingredients as originally compounded, although over the years many attempts were made to improve it by various additions, or subtractions. For centuries it was considered to be a cure-all for almost every human ill including the bites of poisonous animals.

Today we seem to be reverting to the days of mithridatium, as numerous medicaments appear containing from several to many ingredients, usually without their value having been proved any greater in such combination. Even the value of the universally used combination of acetylsalicylic acid, acetophenetidin (phenacetin), and caffeine, produced under many names is not clearly established.

Salter states that "the antipyretic-analgesic drugs [to which group acetylsalicylic acid and acetophenetidin belong] arose through mistaken concepts as to the significance of fever and the

[1] D. G. Friend, Polypharmacy—Multiple-ingredient and Shotgun Prescriptions, *N. Eng. J. Med., 260:* 1015–1018, 1959.

role of quinine in non-malarial infections." Further, he adds, "It is not clear why caffeine should help a headache." [2]

If the physician resorts to the use of fixed combinations of drugs, he immediately relinquishes his control of the dosage of each ingredient. Not every patient responds in the same way to a dosage of a drug, and it should be the duty of the physician to adjust the dosage of medication to the need of the individual patient.

Friend lists several pharmacological principles to serve as a guide in therapy.[3] These include, among others, the following: "It is always most desirable, whenever possible, to employ only a single agent for a given therapeutic purpose. The dose of a drug must be adjusted to the needs of the patient. . . . The use of preparations with two or more ingredients should be avoided *unless each agent directly contributes to the effectiveness of the compound.* . . . Preparations containing more than three ingredients may usually be regarded as therapeutically unsound."

The combinations of potent and sometimes dangerous drugs with others is especially bad. The incorporation of penicillin or other antibiotic into the formula of the "cold" or "grippe" tablet is undesirable and without merit. Such formulations lead to the use of antibiotics in virus infections where they are contraindicated, and even in the treatment of bacterial infection their use is hardly rational. If the antibiotic is effective, symptoms may be relieved in twenty-four hours, and the analgesic and antipyretic part of the formula is no longer necessary. And what useful purpose has been served? The physician has had to write one prescription instead of two, and the patient has had to swallow only half as many tablets. Do these minor conveniences warrant the cost in disadvantages?

There are many examples of similarly unsound combinations of drugs which are widely advertised and distributed, but there is no need to point them out. Any physician can avoid their pitfalls if he will assume full responsibility for prescribing for his patients instead of writing the name of the currently advertised example of modern mithridatic polypharmacy.

[2] W. T. Salter, *A Textbook of Pharmacology* (Philadelphia: W. B. Saunders, 1952).
[3] D. G. Friend, *op. cit.*

WHITE HOUSE CONFERENCE ON CHILDREN AND YOUTH

THE American College Health Association is one of nearly five hundred national organizations affiliated with the Golden Anniversary White House Conference on Children and Youth. Seven thousand delegates will receive invitations from the President of the United States to attend the Conference, which is scheduled for March 27–April 2, 1960, in Washington, D.C. This is the sixth such decennial conference held in the United States since President Theodore Roosevelt called the first in 1909.

The Council of National Organizations on Children and Youth of the Golden Anniversary White House Conference on Children and Youth is the framework joining the several hundred organizations of widely different size, interests, and character. Shared by all is a concern for the well-being of children and youth that is expressed through each organization's programs and activities.

Dr. Carl Wise is the person officially designated to represent the ACHA on the Council.

The Council of National Organizations is one of three major groups functioning in preparatory work for the Conference. Others are the National Council of State Committees on Children and Youth, made up of Governor-appointed citizen committees in every state and territory and the Interdepartmental Committee on Children and Youth, representing thirty-four agencies of the federal government.

Combined, they already have brought several million Americans into pre-Conference activity, taking national inventory of the needs, services, and problems of children and youth, and furnishing this information to White House Conference headquarters in Washington.

The purpose of the Golden Anniversary White House Conference, as stated in its theme, is "to promote opportunities for children and youth to realize their full potential for a creative life in freedom and dignity."

Therefore, "action support in the follow-through phase after the Conference" is a primary objective of planning even at this

stage, according to Mrs. Rollin Brown of Los Angeles, chairman of the President's National Committee for the Conference. President Eisenhower is national honorary chairman, and Arthur S. Flemming, Secretary of Health, Education, and Welfare, is honorary vice-chairman.

National organizations can make a special contribution to Conference follow-up. Via their already existing networks of state and local units, their membership will be in a position to inspire general citizen action, starting next April, to meet the needs of youth revealed through the Conference. In so doing, each organization will be furthering its own aims on behalf of children and youth. Each can be thinking now about how it will shape its own assignment to see that new services, new techniques, and new approaches come into being in line with the Conference's inspirational theme.

"The broad concerns of every national organization affiliated with the Golden Anniversary White House Conference will be included in some phase of the Conference program during the week of March 27–April 2, 1960," according to Dr. Philip S. Barba of Philadelphia, chairman of the Committee on Program for the White House Conference.

Dr. Barba explains that the program format for the Conference will deal with youth from an interdisciplinary approach rather than from a specialist approach.

Each delegate will be assigned to a work group of not more than thirty, including lay and professional persons interested and active in fields relating to children and youth. The subject to be discussed in each work group will cut across discipline lines so as to stimulate new perspectives and broaden knowledge by the exchange of information and experiences.

National organizations will nominate 1,700 of the total of 7,000 persons to be invited to the Golden Anniversary White House Conference, March 27–April 2, 1960, with each organization allotted a minimum of two nominees.

Of the 1,700, 300 are to be youth representatives aged sixteen through twenty-one. An additional 200 are to be young adults between the years of twenty-one and thirty. This request to national organizations to nominate youth delegates to the Conference reflects an over-all formula which will build youth representation

into the Conference. The young people will be treated as full-scale delegates, taking their place beside adults in work groups dealing with every current problem facing American children and youth.

Each member organization in the Council of National Organizations on Children and Youth is being asked if it has youth or young adult members. If so, the organization will be asked to indicate how many such members it has in each group and whether the organization wishes to receive invitations in either or both age ranges.

Rheumatic Fever and Rheumatic Heart Disease among College Freshmen

(A Two-Year Interim Report—1956 and 1957)*

ROY P. SANDIDGE, JR., M.D., ARNOLD L. NIELSEN, M.D., AND MARGARET A. EVANS, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, WASHINGTON, D.C.

IT is now generally agreed that Group A hemolytic streptococcal infections are in some way causally related to the onset and recurrences of rheumatic fever.[1] Since the basis for prevention of rheumatic fever was reported by Coburn in 1938,[2] there has been a growing body of evidence that continuous antistreptococcal prophylaxis can and does prevent recurrent attacks of rheumatic fever.[3] Further, it has been adequately demonstrated that the

* Presented before the Section on Clinical Observations and Research, American College Health Association, Thirty-seventh Annual Meeting, Philadelphia, May 8, 1959.

[1] American Heart Association, Prevention of Rheumatic Fever and Bacterial Endocarditis through Control of Streptococcal Infections, 2d rev., prepared by the Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis, *Circulation, 15:* 154–158, 1957.

[2] A. F. Coburn and L. V. Moore, The Prophylactic Use of Sulfanilamide in Streptococcal Respiratory Infections, with Especial Reference to Rheumatic Fever, *Journ. Clin. Invest., 18:* 147–155, 1939.

[3] C. B. Thomas and R. France, A Preliminary Report of the Prophylactic Use of Sulfanilamide in Patients Susceptible to Rheumatic Fever, *Bull. Johns Hopkins Hosp., 64:* 67–77, 1939; C. A. Chandler and H. B. Taussig, Sulfanilamide as a Prophylactic

likelihood of progressive heart damage can be minimized by the continuous use of antistreptococcal prophylaxis.[4]

The judicious use of chemoprophylaxis was officially adopted as early as 1943 at a U.S. Children's Bureau conference on rheumatic fever.[5] The advent of penicillin further strengthened the concept of prophylaxis in rheumatic fever,[6] and a national statement was issued in 1953 by the American Heart Association supporting its use.[7] These original recommendations of the American Heart Association have been somewhat revised on two occasions but without changing the recommendation in favor of prophylaxis.[8]

Notwithstanding the mounting evidence in support of the concept of prophylaxis in rheumatic fever, there has been speculation that prophylaxis is not being used sufficiently. As recently as March 1958, Dr. Katherine Dodge Brownell, in an address before a conference on Rheumatic Fever Secondary Prevention Programs in Chicago said, "Yet now in 1958, I should be willing to hazard the guess that a relatively small proportion of the country's rheumatic patients are receiving effective continuous prophylaxis." [9]

Agent in Rheumatic Fever, *Bull. Johns Hopkins Hosp., 72:* 43–53, 1943; B. F. Massell, J. W. Dow, and T. D. Jones, Orally Administered Penicillin in Patients with Rheumatic Fever, *J.A.M.A., 138:* 1030–1036, 1948.

[4] G. H. Stollerman, J. H. Rusoff, and I. Hirschfeld, Prophylaxis against Group A Streptococci in Rheumatic Fever: The Use of Single Monthly Injections of Benzathine Penicillin G, *New England J. Med., 252:* 787–792, 1955.

[5] U.S. Children's Bureau, *Proceedings of Conference on Rheumatic Fever, Washington, D.C., Oct. 5–7, 1943* (Children's Bureau Pub. No. 308; Washington, U.S. Govt. Print. Off., 1945), 135 pp., paper.

[6] F. W. Denny, L. W. Wannamaker, W. R. Brink, C. H. Rammelkamp, and E. A. Custer, Prevention of Rheumatic Fever: Treatment of the Preceding Streptococcic Infection, *J.A.M.A., 143:* 151–153, 1950; B. F. Massell, G. P. Sturgis, J. D. Knoblock, R. B. Streeper, T. N. Hall, and P. Norcross, Prevention of Rheumatic Fever by Prompt Penicillin Therapy of Hemolytic Streptococcic Respiratory Infections, *J.A.M.A., 146:* 1469–1474, 1951.

[7] American Heart Association, Prevention of Rheumatic Fever, *Mod. Concepts Cardiovas. Dis.*, 22, No. 1, 1957; E. L. Harmon, H. F. Swift, F. W. Lewy, D. E. Young, and M. T. Bellows, The Protection of Rheumatic Fever Patients Cared for on the Wards of General and Children's Hospitals, *Circulation, 7:* 314–315, 1953; B. B. Breese, M. T. Bellows, E. E. Fischel, A. Kuttner, B. F. Massell, C. H. Rammelkamp, and E. R. Schlesinger, Prevention of Rheumatic Fever, *Circulation, 7:* 316–319, 1953.

[8] American Heart Association, Prevention of Rheumatic Fever and Bacterial Endocarditis through Control of Streptococcal Infections, 1st rev., *Circulation, 11:* 317–320, 1955; American Heart Association, *Circulation, 15:* 154–158.

[9] American Heart Association, Report and Recommendations of the Conference on Rheumatic Fever Secondary Prevention Programs, Chicago, March 9–11, 1958.

This raises a question which cannot be answered by previously reported data.

The question is also often raised as to the effect that prophylaxis has had on the prevalence of rheumatic fever and its heart complications. Many workers believe that the prevalence and severity of rheumatic fever is declining. It is known from a review of the vital statistics that there has been a downward trend in the mortality rates since prior to 1944; [10] however, a similar decline in prevalence or severity has not been documented.

PURPOSE OF THE STUDY

Studies designed to show whether or not there has been an actual downward trend in the prevalence of rheumatic fever with its accompanying heart involvement would be helpful in providing documentary evidence for these considerations. There is also a need to evaluate the total effectiveness of rheumatic fever prophylaxis. The study of similar population samples for several successive years could possibly determine whether or not there has been a continuous decline in incidence of first attacks of rheumatic fever. Recurrence rates need to be examined for both those who have been on prophylactic regimens and those who have not. Possibly this information would prove valuable, too, in determining the number of years during which prophylaxis should be taken.

Such studies, if done on larger population groups distributed throughout the nation, may, in addition, define certain variables which may be associated with rheumatic fever. Geographic differences in rates may become apparent, showing areas where there is a greater concentration of the disease, as one example.

In addition, it is most important to learn how extensively prophylaxis is being applied and to note any changes in the trend of its application.

THE STUDY POPULATION

It was decided that college and university students would be a suitable population group in which to undertake such a study.

[10] U.S. Public Health Service, *Cardiovascular Disease: Data on Mortality Prevalence, Control Activities* (Public Health Service Publication No. 429; Washington: U.S. Govt. Print. Off., 1956).

This decision was based on the following considerations: students entering colleges and universities provide an accessible population for study; a large group of students are regularly examined as a part of the college entrance requirements; by selecting schools distributed throughout the country, geographic differences can be noted; ample data for studying sex and race patterns may also be derived.

Entering college students who have had rheumatic fever are young enough (average ages 18–20) to have experienced the illness comparatively recently and should be able to remember details concerning it and the medications they may have taken. At the same time these students are in an age group which would be expected to have benefitted from educational programs related to rheumatic fever prophylaxis. It is recognized, of course, that college freshmen are not a representative sample of the population of the United States for this age group. However, the medical care given to college freshmen, it is expected, would be as adequate as that given to the noncollege population. Any bias introduced would be in the direction that more prophylaxis had been used in this group as compared to the total population.

Discussion with members of the American College Health Association revealed that almost all of the health services were interested in the project and would be willing to participate in it if it could be fitted into their normal procedures. Health services ask numerous questions pertaining to a history of rheumatic fever and perform cardiac diagnostic examinations as a part of their regular programs. College and university participation in such a research project could also serve to focus increasing attention on the early detection of heart disease.

The feasibility of this study within this particular population group has been demonstrated many times over by the willing and helpful co-operation given by the students and the directors of the student health services and their staffs.

METHOD OF STUDY

The data used in this study were obtained by questionnaire through the co-operation of student health services throughout the country. The schools were provided with the necessary report

forms, which upon completion were returned to the Heart Disease Control Program of the Public Health Service for analysis.

The questionnaire is comprised of two parts, one of which is completed by the student and the other by the examining physician. All entering freshmen in the participating colleges completed a brief self-history, answering questions pertaining to: (1) manifestations of rheumatic fever and its sequelae, (2) previously having been told by a physician of the presence of rheumatic fever. Those students who had been told they had rheumatic fever were asked to answer additional questions about the number of attacks, the age at which attacks occurred, whether medication was given, the kind given, how long it was continued, and whether it was still being taken at the time of completing the questionnaire.

The second section was completed by a physician for all students with a positive or suspected history of rheumatic fever, or with rheumatic heart disease. The physician indicated whether, in his opinion, there was a valid history of rheumatic fever and reported any physical evidence of the presence or absence of heart disease disclosed during the physical examination.

In reviewing the completed study forms for the first two years of the proposed five-year study, a question was raised as to the uniformity of reporting by the many participating schools. It was also felt that variations in methods of completing the two sections of the form may possibly "color" the findings. For this reason a survey was done to determine the procedure used by each health service in having the questionnaire completed. Table 1 shows the results of this survey. A complete analysis of these results will be mailed to each participating health service; however, two comments might be made at this time. First, there is some indication, from reviewing the replies in Section A (completed by the student) that students who fill out the self-history at their leisure—either at home or at school away from the rush of registration and orientation—give more complete answers, as indicated by fewer "don't know" replies. Secondly, it was reassuring to see that either the family or university physician completed Section B in all but 6.5 per cent of the health services. The attention the physicians have devoted to this section has been most gratifying, and we wish to emphasize the extreme importance it has in the conclusions that will be reached from this study.

Table 1. Summary of response to questionnaire on method of participation

No. of schools planning to participate	128
No. of questionnaires returned	107
per cent response	83.5

Method of participation	Schools returning questionnaire No.	Schools returning questionnaire %	% of students
Section A—How completed			
A. Mailed to the students prior to matriculation	24	22.4	17.9
B. It is given to him at the health service at time of his physical	46	43.0	46.4
C. It is given to him at school at a place other than the health service	32	30.0	27.3
D. Other	5	4.6	8.4
Section B—How completed			
A. Completed by university physician during exams or from notes made during exam	63	58.9	51.5
B. Completed by family physician	13	12.2	7.5
C. Completed by university physician from data on college health form submitted by family physician; re-exam positives	24	22.4	34.1
D. Completed by health service personnel from college health form	7	6.5	6.9
Section B—Completed for whom			
A. All freshmen	59	55.2	38.7
B. Only those showing a history or physical findings on college health form	39	36.4	54.2
C. Only those with history in Section A (*we lose newly discovered heart disease in absence of history*)	6	5.6	5.0
D. Other	3	2.8	2.1

FINDINGS

During the first year of the study, which includes the 1956–1957 school year, there were 88 colleges and universities participating. During the second year, 13 of these withdrew from the study for various reasons, while 14 others entered for the first time. This gives reports from 102 different schools with two complete years of data for 75 of them.

Prevalence

During the first two years of the study, questionnaires were completed by 176,588 entering freshmen students (Table 2).

Table 2. Prevalence of rheumatic fever and rheumatic heart disease among 176,588 college freshmen examined during 1956 and 1957

History of rheumatic fever	Total		Rheumatic heart disease			
			Definite rheumatic heart disease		Possible rheumatic heart disease	
	No.	Rate per 1,000	No.	Rate per 1,000	No.	Rate per 1,000
Total*	4,481	25.4	516	2.9	864	4.9
Definite history	2,748†	15.6	398	2.2	382	2.2
Questionable history	1,373	7.8	47†	0.3	193	1.1
No history	360	2.0	71†	0.4	289	1.6

* Total positives include all students with a history (definite or questionable) of rheumatic fever and/or a diagnosis of rheumatic heart disease (definite or possible).

† These students (total = 2,866) are considered "definite positives," i.e., having either a definite history of rheumatic fever or a definite diagnosis of rheumatic heart disease.

While most of these were found to be negative for purposes of this study, there were 4,481 who were diagnosed as having either definite or questionable histories of rheumatic fever or findings indicative of rheumatic heart disease. This represents a rate of 25.4 per 1,000 entering freshmen studied. Of these, 1,380 (7.8 per 1,000) were reported as having rheumatic heart disease; 516 were diagnosed as having definite rheumatic heart disease, while 864 had possible rheumatic heart disease. The rate of 7.8 per 1,000 is considerably lower than the 11.6 per 1,000 examinations reported by Hedley in 1938 as a result of a questionnaire survey of 86 colleges.[11]

Of the 1,380 students who had rheumatic heart disease, there were 360 cases who had no previous history of rheumatic fever. This represents 26.1 per cent, which demonstrates the value of having physical examinations of all students to be included in the

[11] O. F. Hedley, Incidence of Rheumatic Heart Disease among College Students in the United States, *Pub. Health Rep., 53:* 1635, 1938.

study, whether done at home or at school and whether or not there is a history indicated in Section A of the questionnaire. In a report on 4,994 men disqualified for military service because of cardiovascular defects, Levy, Stroud, and White found that approximately 70 per cent of those men with rheumatic heart disease did not have previous histories of rheumatic fever.[12] If it is true that college students have better medical care than the noncollege population; one might expect fewer cases of rheumatic heart disease without a previous history among the college group. However, the difference between the 26.1 per cent found in this study and the "best group" reported by Levy *et al.* is greater than might normally be anticipated. For this reason we would like to reemphasize the importance of examining and reporting the physical findings on all students in the study. This serves to ensure the inclusion of all cases of heart disease caused by rheumatic fever as well as to provide useful information for the school health management.

With only two years of the study completed, it is too soon to make any statement as to trends. At the end of the five years—the proposed duration of the study—it should be possible to estimate whether or not there is a general downward trend in the prevalence of this disease.

Geographic Distribution

Of the 4,481 total positives shown in Table 2, there were 2,866 who were considered definite positives, i.e., having either a definite history of rheumatic fever or a definite diagnosis of rheumatic heart disease without a definite history of rheumatic fever (figures with daggers in Table 2). This gives a rate for the entire United States of 16.2 per 1,000 freshmen studied.

Figure 1 shows prevalence by state of residence (in quartiles) for those students considered definite positives. Despite the fact that the number of examinations and the number of positives upon which the rates are based are quite small for some states, a geographic pattern emerges with contiguous states tending to have

[12] R. L. Levy, W. D. Stroud, and P. D. White, Report of Re-examination of 4,994 Men Disqualified for General Military Service Because of the Diagnosis of Cardiovascular Defects, *J.A.M.A.*, *123:* 937–944, 1029–1035, 1943.

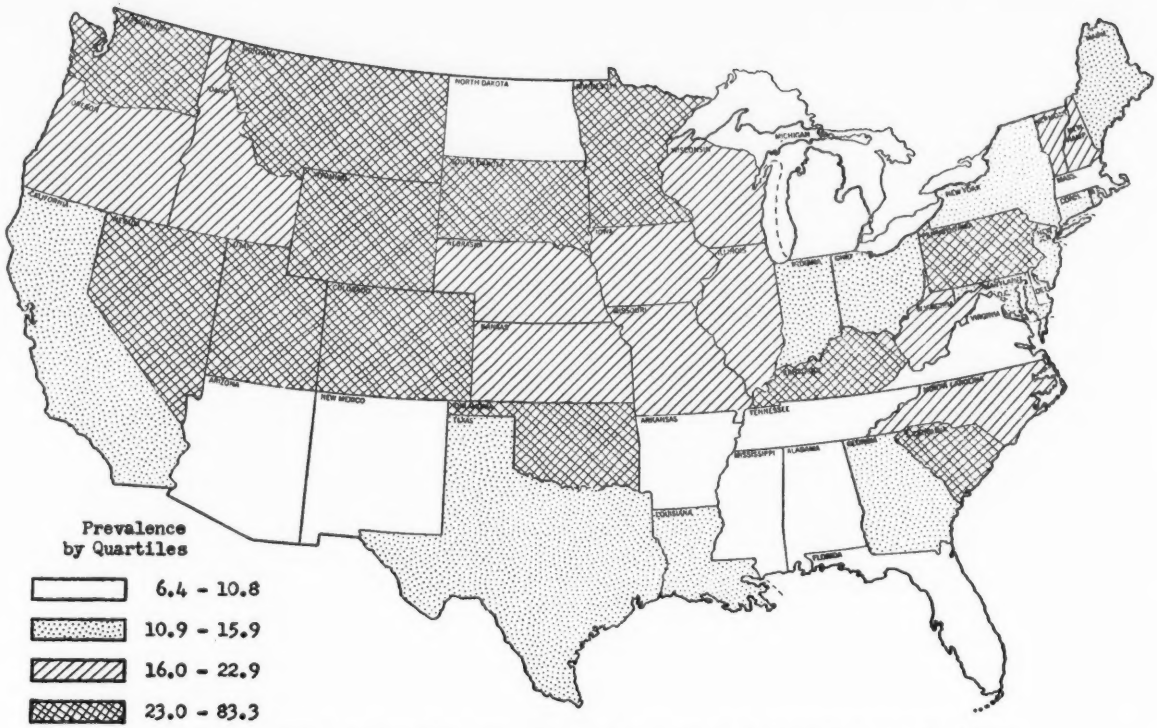

Figure 1. Prevalence of definite rheumatic fever and rheumatic heart disease by state of residence.

similar prevalence rates. As indicated in the work of others,[13] the highest prevalence is in the Rocky Mountain area, while the southern states tend to have a lower prevalence. When data for the 1958–1959 school year are analyzed and combined with those for the first two study years, possibly a more clear-cut geographic pattern will appear.

Some assurance that the pattern of rates shown on Figure 1 is not due to variations in diagnostic criteria from school to school is provided by the fact that the prevalence of affirmative replies to the question "Have you ever been told by a physician that you had rheumatic fever?" when plotted on a map, shows a geographic pattern quite similar to the pattern of definite positives shown on Figure 1.

Extent of the Use of Prophylaxis

The American Heart Association recommendations for prophylaxis is for all persons "who have a well documented history of rheumatic fever or chorea, or who show definite evidence of rheumatic heart disease" to be given prophylaxis "as soon as the diagnosis of rheumatic fever is made" and that the treatment should be continued indefinitely.[14] If this recommendation were followed, all students who had previously been told by a physician that they had rheumatic fever and who were found on re-examination by the university physician to have either a definite history of rheumatic fever or definite rheumatic heart disease should have been on continuous prophylaxis at the time they completed the questionnaire.

Of the 2,866 students who were found by the questionnaire to have either a definite history of rheumatic fever or a definite diagnosis of rheumatic heart disease, 2,633 had been told by a physician, prior to college entrance, that they had had rheumatic fever. This is the group that should definitely have been receiving prophylactic medication for the prevention of recurrent rheumatic fever. Table 3 shows that only 47.0 per cent, or 1,238, of these students were ever put on prophylaxis. There were 288, or only

[13] J. R. Paul, *The Epidemiology of Rheumatic Fever* (New York: American Heart Association, 1957).

[14] American Heart Association, *Circulation, 15:* 154–158.

Table 3. Number and per cent of students who should have been on prophylaxis by history of prophylaxis

History of prophylaxis	No.	%
Total who should have been on prophylaxis	2,633	100.0
Ever on prophylaxis	1,238	47.0
Currently on prophylaxis	288	10.9

10.9 per cent of all those who should have been on continuous prophylaxis, who reported that they were still taking medicine at the time they completed the questionnaire.

Recurrences

As might be expected, most of the 4,481 students with histories of rheumatic fever or rheumatic heart disease reported having had only one attack (Table 4). However, there were 520 students (11.6 per cent) who had had at least one recurrent attack of rheumatic fever. Of these, 106 reported having had two attacks, and 25 reported having had three or more attacks.

Factors Correlated with Continuous Use of Prophylaxis

Findings from the first two years of the study seem to indicate that there are two factors most frequently correlated with being on continuous prophylaxis, i.e., having had recurrent attacks of rheumatic fever and/or having a diagnosis of rheumatic heart disease. Only 8.0 per cent of those students with one attack of rheumatic fever were on continuous prophylaxis as compared with

Table 4. Number and per cent of students by number of recurrent attacks of rheumatic fever

No. of recurrent attacks	No.	%
Total	4,481	100.0
No recurrent attacks	3,961	88.4
With 1 or more recurrent attacks	520	11.6
1 recurrent attack	389	8.7
2 recurrent attacks	106	2.3
3 recurrent attacks	17	0.4
4 or more recurrent attacks	8	0.2

Table 5. Number and per cent of students who should have been on prophylaxis by number of attacks of rheumatic fever and current prophylaxis status

No. of attacks of rheumatic fever	Students who should have been on prophylaxis		
	Total no.	Currently on prophylaxis	
		No.	%
Total	2,633	288	10.9
1 attack	2,113	170	8.0
2 or more attacks	520	118	22.7

22.7 per cent of those who had had two or more attacks (Table 5). Most of those with recurrent rheumatic fever did not begin their prophylaxis until after their most recent attack.

Table 6 shows that 38.1 per cent of those students with definite rheumatic heart disease were currently on prophylaxis as compared with 18.4 per cent of those with possible rheumatic heart disease and only 5.9 per cent of those with no rheumatic heart disease.

DISCUSSION

The analysis of the first two years of this five-year study has already yielded some very interesting information concerning the over-all picture of rheumatic fever, rheumatic heart disease, and their prevention. The data thus far has pointed out the need for ancillary investigations that will enhance the value of the larger

Table 6. Number and per cent of students who should have been on prophylaxis by heart disease status and current prophylaxis status

Heart disease status	Students who should have been on prophylaxis		
	Total no.	Currently on prophylaxis	
		No.	%
Total	2,633	288	10.9
Definite rheumatic heart disease	312	119	38.1
Possible rheumatic heart disease	250	46	18.4
No rheumatic heart disease	2,071	123	5.9

study. In addition, it appears likely that the analysis of the full five-year data will yield much of the hoped for information.

An important finding has been that over 25 per cent of those students with rheumatic heart disease have no previous history of rheumatic fever. This finding is supported by data reported on other study groups, but never on such a wide scale geographically. The fact that over 25 per cent in this study and over 75 per cent reported in other studies have no previous history of rheumatic fever indicates the extreme importance of careful physical examinations. Reliance cannot be placed on history alone as a screening mechanism in rheumatic fever case findings.

This information demonstrates why each student included in the study must have a physical examination whether he has a history of rheumatic fever or not. For purposes of validating the data to be reported, Section B should be filled out on all students in the study. This can be accomplished by having the student take the form to his family physician at his pre-entrance physical, or it can be filled out by the school physician or members of his staff from school physical examination records. However it is completed, there should be some expression on each student's form as to the presence or absence of heart disease. If not, the data from that school is invalidated and must be excluded from the total in order not to introduce a bias.

The data on prophylaxis as presented here lends convincing support to opinions such as Dr. Brownell's, that only a small proportion of the country's "rheumatics" are receiving effective continuous prophylaxis. This information, though discouraging in itself, is important in establishing objectives for future national and local control programs. The first question that arises in considering this information is: why are so few on prophylaxis when its value has been so well demonstrated? It is true that the death rate from rheumatic fever and rheumatic heart disease has been slowly declining; however, it is still far in excess of that for poliomyelitis. Nearly as many people died of rheumatic heart disease yearly as contracted polio each year prior to the advent of Salk vaccine. There are also more deaths from rheumatic fever and rheumatic heart disease in each age group above five years than occur from tuberculosis. In fact, excluding malignant neoplasms,

rheumatic fever and rheumatic heart disease account for more deaths in the college-age level than any other disease. These deaths could be reduced dramatically by universal application of antistreptococcal prophylaxis for people with known rheumatic fever or rheumatic heart disease.

To work toward this goal, it will be helpful to know more about what factors are responsible for motivating an individual to remain on prophylaxis. Some factors such as recurrences and the presence of heart disease have already been mentioned. Preliminary work has been undertaken to establish techniques to delineate further motivational factors in prophylaxis, and we hope to engage in pursuits in this direction next year.

As we indicated, the distribution on a geographic basis conforms to information established by other investigators. Additional schools participated during the third year of the study. These were distributed in such a manner that we feel an even more representative coverage will be attained in future reports.

At the end of the proposed five years we feel that sufficient data will be collected to indicate the presence or absence of any specific trends in prevalence. Any conclusions drawn from the two-year results might be premature and misleading. Whether any specific trends emerge or not, the base lines established at this time will be important for comparison with future developments.

Information on sex and race differences in prevalence, development of heart disease, and frequency of recurrences should certainly emerge from an analysis of the five-year results.

Further understanding of the problem of keeping people on prophylaxis may also be intimately associated with the length of time between the initial and subsequent attacks of rheumatic fever. The total five-year data will be analyzed for this information as it appears in this population group.

SUMMARY

1. During the first two years of a proposed five-year study of rheumatic fever and rheumatic heart disease among entering college students, there were 176,588 questionnaires completed in 102 colleges and universities throughout the United States. Of these,

there were 4,481 with either a definite or questionable history of rheumatic fever or findings indicative of rheumatic heart disease. This represents a prevalence rate of 25.4 per 1,000. (See Table 2.)

2. There were 1,380 (7.8 per 1,000) believed to have rheumatic heart disease; 516 had definite rheumatic heart disease, and 864 had possible rheumatic heart disease.

3. A total of 360 students (26.1 per cent) who had rheumatic heart disease had no previous history of rheumatic fever. (See Table 2.)

4. The geographic distribution of rheumatic fever prevalence, as demonstrated thus far, is in agreement with that reported in the work of others. (See Figure 1.)

5. Of the 2,633 students who should, by present standards, have been receiving prophylaxis, only 1,238 (47.0 per cent) had ever been on prophylactic medication, and only 288 (10.9 per cent) were still on prophylaxis at the time of completing the questionnaire. (See Table 3.)

6. Recurrent attacks were reported by 520 students, or 11.6 per cent of the total positives. (See Table 4.)

7. The two factors most frequently correlated with continuous prophylaxis were recurrent attacks of rheumatic fever and/or a diagnosis of rheumatic heart disease. (See Tables 5 and 6.)

A Tuberculin Study in College Freshmen*

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WE now have the basic knowledge and tools for the control of tuberculosis. This has been brought about by the proper use and interpretation of the tuberculin test and chest x-ray, by the improvement in bacteriologic techniques, by the results of more thorough epidemiologic studies, by the discovery of drugs effective against the tubercle bacillus, and by the improvement in surgical treatment. All of this adds up to fewer cases, fewer sick days, and lower mortality.

Tuberculosis surveys in past decades indicated a sharp rise in morbidity in early adult life, the period in which a large segment of the population is attending our colleges. Today we have very little active disease in this group, but those of us who practice medicine on the college campus must remain aware of and on guard against this ever-present threat. History will repeat itself, given the opportunity.

The college student can be an easy target for the tubercle bacillus. Some who leave home run up against adjustment problems, feel the lack of parental guidance, work too hard, play too hard, sleep too little, or take too many artificial stimulants. Some have financial needs that must be met by extracurricular employment. The problems that confront these students are many and

* Presented before the Section on Tuberculosis Control, American College Health Association, Thirty-seventh Annual Meeting, Philadelphia, May 7, 1959.

tend toward a lowering of resistance to infection. Then, too, students tend to ignore entirely, or delay reporting seemingly minor symptoms. A good college health department will aim at correcting some of these adverse forces and at the same time should include a specific program of control against tuberculosis.[1]

The recent enthusiasm for the tuberculin test as a case-finding instrument is well deserved. Its safety is unquestioned. Unfavorable effects are rarely, if ever, seen. Its choice, instead of the x-ray, as the initial case-finding device is in keeping with the repeated advice that medical radiation be kept at a minimum. A negative reaction is almost certain evidence that an apparently well individual does not have tuberculosis.[2] A positive reaction to tuberculin is certain evidence of tuberculous infection.

It was felt that by carrying out a tuberculin case-finding study we could accomplish much. We could identify the positive and negative reactors. We might uncover active cases of tuberculosis early enough to arrest the disease with a minimum of lost time for the patient and early enough to treat the patient before the disease advanced to a stage of contagiousness to others. We have continued to see active tuberculosis in a contagious state in two or three students each year. Our results would certainly establish the prevalence rates in the group studied. By carrying out the program we could stimulate interest in the prevention of disease and raise the student's level of knowledge concerning tuberculosis and its control.

In the summer of 1958 a decision was made to tuberculin-test the incoming freshman class. In an explanatory note we advised the student that he was in an age group that was particularly susceptible to tuberculosis. We described the test and told of its simplicity, safety, and importance as a case-finding method. Since most students were under the age of twenty-one we asked each one to see to it that his parent or legal guardian signed a form allowing us to carry out the test.

Of the 1,152 requests sent out, sixty-seven were returned un-

[1] J. A. Myers, R. D. Boynton, and H. S. Diehl, Tuberculosis among University Students: A 35-Year Experience, *Ann. Int. Med., 46:* 201–217, 1957.

[2] S. J. Berte, A Study of Tuberculin Hypersensitivity in 510 Patients Hospitalized for the Treatment of Active Pulmonary Tuberculosis, *Am. Rev. Tuberc.*, Sept. 1956, p. 474.

signed. Thirteen or about 1 per cent of the total represented outright refusals. Some of these belonged to religious groups that dictated against acceptance. A few were advised against the program by doctors who were opposed to it. A few refused to be part of any statistical study. Fifty-four students returned unsigned slips because of an oversight, and later these were returned for proper signature.

Before carrying out the tuberculin test, we questioned each student about the results of previous tuberculin skin tests and chest diseases. Anyone known to have had a positive skin test or to have been treated for any form of tuberculosis was excused from taking the test; arrangements were made to x-ray the chests of these students. These known reactors, twenty-one in all, are included in the statistics in Table 1 in order to give a true picture of the overall problem of tuberculosis infection in the freshman class.

The students were tuberculin-tested at the beginning of the fall term when they were given their initial medical examinations. We used a single intermediate strength (0.0002 mg.) of the Purified Protein Derivative Tuberculin intradermally (Mantoux Test). The procedure, methods, and forms for the study are fully described in the National Tuberculosis Association's publication, *Tuberculin Testing Handbook*.[3]

We elected to use a single intermediate-strength dose of tuberculin, because it will identify with rare exception those who have been infected and practically never produces a severe necrotic reaction such as is often seen when a "second-strength" dose is used. It also has an advantage over the "first-strength" dose in that it identifies a certain number of positive reactors who may have been missed by the tuberculin of lesser strength. The preliminary testing with a "first-strength" dose would have made necessary the retesting of over 95 per cent of our group with a stronger dose.

Induration of 5 mm. or more at the site of the injection at 48 to 72 hours was the sole criterion for a positive reaction. Anything less than this was considered a negative reaction. The intradermal tests were applied by physicians and by a registered nurse trained

[3] *Tuberculin Testing Handbook*, published by the National Tuberculosis Association, 1790 Broadway, New York 19, N.Y.

in this technique. Reactions of any degree were interpreted only by physicians familiar with this method of testing. There is no reason, however, why a nurse could not be trained in measuring and recording reactions.

To each student who completed the test a dated card was given (see Cards 1 and 2). On it was printed a statement to the effect

Name.....Date.....

Your tuberculin skin test is POSITIVE. This means that you were exposed to tuberculosis and became infected. Only a certain percentage of those infected will develop pulmonary tuberculosis.

You are urged to have regular and repeated chest X-rays throughout your adult life to guard against developing that disease.

KEEP THIS RECORD. Generally speaking, once you become a POSITIVE (tuberculin) reactor, you will always be one; therefore, you need never accept another tuberculin skin test.

HARVARD UNIVERSITY HEALTH SERVICES

Card 1

that he has reacted positively or negatively. The significance of each reaction was explained. The student was advised to keep the report of the test. Those who were positive were given x-ray ap-

HARVARD UNIVERSITY

Name.....

We are pleased to report that your tuberculin skin test was NEGATIVE. This means that so far in your life you have not come in close contact with an active case of tuberculosis and have no trace of tuberculosis.

KEEP THIS RECORD. A negative report of tuberculin skin test is significant, especially if the test becomes POSITIVE in some future testing.

UNIVERSITY HEALTH SERVICES
15 Holyoke Street, Cambridge, Mass.

Card 2

pointments and advised to repeat the x-ray yearly. They were also advised to decline further tuberculin tests since they were now known positive reactors. Those who were tuberculin negative were told that they needed no x-rays and that their only indication for ever needing one, as far as tuberculosis was concerned, would be a positive tuberculin test at a later date.

A total of 1,032 freshmen were screened. Fifty-three failed to return in 48 to 72 hours to have their arms read. Seventy-five (7.2 per cent) were tuberculin positive. Five per cent of 965 students born in the United States were tuberculin positive. Of 67 foreign-born boys, 23 (34 per cent) were tuberculin positive (see Table 1).

Table 1. Freshmen tuberculin-tested—result known

	Total	Positive	Negative
American-born	965	52 (5%)	913 (95%)
Foreign-born	67	23 (34%)	44 (66%)
Combined	1,032	75 (7.2%)	957 (92.9%)

It is clear that there is a higher percentage of positive reactors among foreign-born students. For many years we have insisted that all foreign-born students have a recent chest x-ray as a requirement for admission to the University. Since one in every three foreign-born students has a positive reaction to tuberculin, we will continue to insist on the exclusion of active disease in this group prior to admission.

No freshman with a positive skin test or a past history of tuberculous infection had active pulmonary disease when x-rayed. Several showed evidence of a primary complex, calcified hilar nodes, or old pleuritis. We plan to follow all positive reactors by taking annual x-rays during their stay in the University.

We believe that a tuberculosis case-finding study is a worthwhile activity for a university health service. Except for the armed services (where few women are included) our colleges present one of the best opportunities to institute mass measures for the control of this disease. The importance of labeling, tuberculinwise, each new student registering at the University, cannot be too strongly

emphasized. This is information to which we will be referring during the student's stay at the University.

With the incidence of tuberculous infection of 7.2 per cent it is important to identify each positive reactor and x-ray his chest for active disease. Recent studies have shown that 1.8 of every 1,000 of those infected come down with tuberculosis each year.[4] By taking annual x-rays on all positive reactors we may identify early active infection and treat it before the student is a source of infection to his neighbors.

The negative reactor is of no less interest to us than the positive reactor. A great number of students come to us from areas where tuberculosis prevalence rates are low. We have a large student population of negative reactors coming to a community where tuberculosis prevalence rates are relatively high. By periodic tuberculin testing of these negative reactors we hope to determine the conversion rate, treat recent converters, identify and treat early active cases, and converge upon the source cases through careful screening of contacts.

The value of such a program as ours, from an educational standpoint, should not be underestimated. All of us are constantly aware of our role as health educators. In addition to our work of safeguarding the health of the student, we are constantly driving home principles of good medical practice and campaigning against such bad practices as the indiscriminate use of broad spectrum antibiotics, the too frequent referrals to the roentgenologist, or the misinterpretation by a student of current medical thinking. The setting up of a model control program for the prevention of a communicable disease should prove to be a powerful educational tool. Such a program should include methods that are consistent with the latest medical thinking. Certainly our program of tuberculin-testing students and x-raying the positive reactors is in keeping with the best current medical practice and adds to the student's knowledge of tuberculosis and his interest in tuberculosis control.

[4] L. I. Dublin, The Course of Tuberculosis Mortality and Morbidity in the United States, *Am. J. Pub. Health and the Nation's Health, 48:* 1439–1448, 1958.

CONCLUSIONS AND SUMMARY

1. A case-finding program for undergraduate university students is described.

2. In the fall of 1958, 7.2 per cent of 1,032 men in a college freshman class with an average age of eighteen years were tuberculin positive. Of those born in the United States, 5.4 per cent were tuberculin positive. Of those born outside the United States, 34 per cent were tuberculin positive.

3. In the entire 1,032 men screened, *not one case* of active pulmonary tuberculosis was uncovered.

4. Maintenance by university health services of maximal vigilance on a continuing basis is essential in terms of disease detection and prevention.

5. Screening programs such as those described establish prevalence rates for tuberculosis from year to year in the group studied. These figures will help us to revise our thinking as to effectiveness of our control measures.

6. The incidence of tuberculosis may, in the not too distant future, be reduced to the incidence of smallpox today. This will come about because of improved methods of treating tuberculosis and case-finding programs such as we have described.

Research in Personality Development—The Disturbed College Student in a Therapeutic Setting*

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A great deal has been written and many research projects have been devoted to the early childhood years of personality development, during which pathological factors may begin to mold the individual. Psychiatrists have been primarily concerned with the direct and obvious connection between these pathological factors and later evidence of mental illness. Without questioning in the slightest the validity of this approach one might wonder why the resulting breakdown had occurred at a specific time in the individual's life. We can assume that there are common experiences and common personality characteristics in the group who break down at the onset of adolescence, at the time of marriage, following the birth of a baby, or upon entering college.

Of all these crucial periods of life, and certainly there are others that I have not mentioned, we have chosen the transition to college life as the most fruitful for our study. The reasons we have done

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so are threefold: first, the student and faculty members are readily accessible and inclined to be co-operative; secondly, students are a highly intelligent section of the population and are more accustomed to verbalizing their feelings; finally, there is ever increasing concern with adolescent problems in general and education in particular. From a practical standpoint it would be of benefit to our crowded universities if we were better able to predict which students would become casualties before the end of their first year. Also, the tremendous dropout rate in college represents considerable waste of manpower in an age when academic skills are of utmost importance both to individual and national survival. Any conclusions which we may be able to draw could be of value to colleges not only in screening their applicants but also in providing the most supportive environment possible during this transitional period.

We at the National Institutes of Health are now beginning a study of why some students make a healthy or at least satisfactory adjustment to their new environment while others are unable to cope with it. We are approaching the question with three research teams: one team working in the field to study a cross section of presumably successful students, a second group working on a hospital ward with students who have been recently forced to leave college, and a psychosomatic team who will look for a connection between emotions and body physiology.

The general goal of the field group is easily stated: to discover what life experiences may be helpful, sustaining, and growth promoting during the adolescent's adjustment to college. Obviously, the selection of students for the field study is difficult. It is much harder to define the problem-solving techniques which *are* highly effective than to identify students whose adaptive failure was complete. The latter simply leave college. I will discuss the field group in more detail a bit later.

The goals of the inpatient study, on the other hand, are to find any possible common denominators which characterize the students who have required hospitalization; that is, to develop a fund of information about the background, present environment, and personality of students who "break down" in college. We may speculate that such ordinary but vital experiences as separation

from the family, pressures of increased competition, or strivings for social acceptance will prove to be significant factors. The criteria for selection of this group are easily defined. We are concerned with freshmen students, of either sex, of American cultural background, of any race, and who have been sufficiently unable to cope with a college environment as to require hospitalization. This would include students who leave college for a variety of reasons primarily reflecting emotional difficulties. We are not concerned with any particular syndrome, and we expect that our student patients, initially at least, will cover a rather broad range of illnesses, such as neuroses, psychoses, confusional states, character disorders, and various kinds of adolescent maladjustment. The student's family must be willing to co-operate in terms of providing necessary background information, and the referring physician must feel that the patient would benefit from this type of hospitalization.

Our inpatient program will provide the student with the diagnostic and therapeutic services of both a general and a psychiatric hospital staff. It will include nursing care, social service, psychological evaluation, occupational therapy, art therapy, and other special therapies by personnel specifically trained in techniques of rehabilitation. Certainly as you all know, the National Institutes of Health have as their primary reason for being, research—research at the clinical and theoretical levels. However, I feel that it is worth emphasizing that here, as in any medical center, the therapeutic welfare of the patient is the most important consideration. Therefore, all patients will be given intensive individual psychotherapy which will be integrated into the research study. As with all medical care at the National Institutes of Health it will be provided without cost.

Since some of you might have occasion to refer patients to the Clinical Center, I would like to go into somewhat more detail about the hospital project than about the other two projects. One of our chief aims is to enable the hospitalized student to return to his academic career as soon as possible, should this be desirable. When a patient is accepted, however, we expect that he will be willing to remain at the Clinical Center for a period of from three to six months. All of our patients are admitted voluntarily, and

the ward is entirely open. The ward is located in the Clinical Center Building of the National Institutes of Health in Bethesda. While patients are perfectly free to make use of any recreational or cultural facilities of the community, there is a wide range of activities available to them in the Clinical Center. For students who are interested and able it is possible to participate in a work therapy program, which essentially consists of work in various laboratories in the Clinical Center.

In addition to returning the patient to a productive life, what do we hope to accomplish from the actual period of hospitalization? The atmosphere of the research setting will be structured in a life space continuum to provide the opportunity to study the student's adaptation to it. This will facilitate the investigation of the student's past adaptive experiences in his own family and in his community-social adjustment. As with most psychiatric studies, we will explore whatever patterns within the student's early family life seem related to his current difficulties. For example, it is felt that one of the earliest and most basic traits developed in children is that of trust in the parent figures. We can get some clues about whether his relationships were adequate in this area by studying the extent of his trust in his fellow patients, nurses, therapist, and other members of the staff. Is he secure enough to explore any relationship thoroughly? What means does he use in making friends in the new living situation on a hospital ward? And even more important, what use does he make of these friendships?

For example, the members of our nursing staff make a special brief note of any instance in which they feel a student has made an unusually friendly move toward them or, on the other hand, had adopted an unusually unfriendly attitude on a particular occasion. We gather these notes from a number of staff members about a particular student and analyze the nurses' comments from several points of view: how is the contact between the student and the nurse initiated, what seem to be the student's feelings in the situation and what does he do about them, what are the nurse's feelings and how does she respond, and what eventuates from the brief meeting? We then fit these pieces of information together and try to understand them in the light of the patient's chief preoccupations as spelled out in his sessions with his therapist.

In this way we hope to be able to tease out some characteristic behavior patterns that might be related to what has happened to the student in his home situation and at college. When we can clarify for ourselves these rather complex bits of social interaction and relate them to the student's personality development, we will know something more about why the student decompensated in the college setting.

These questions all relate to the general background of any pathology. Of more immediate interest is the discovery of any precipitating events which accounted for a break at this particular time. This would involve a study of the student's life at college prior to the onset of his illness. For this information it is likely that the patient's own evaluation will not be sufficient. We plan to contact parents, for any light they can shed on the matter. Of course we plan to maintain contact with family members, not only to gain information but to assure their understanding of our program. However, it is probable that friends, faculty members, counselors, housemothers, and so on, who were in more recent touch with the situation can probably furnish more information; therefore, we plan to visit the college in every case. So much for the study of the hospitalized group.

Now I would like to return for a moment to the field study of normally adjusted students. The work which is planned here will directly involve students in only about eight colleges, but it may be of interest as it complements the inpatient project. The field team consists of two psychiatrists, a social worker, a sociologist, and a psychologist. Whereas the inpatient group is concerned with the personality of students who cannot handle college situations, the field group's concern is with the personality characteristics of those who adjust particularly well to the college scene. In other words, what techniques of behavior does the student utilize in coping with more difficult academic standards, new social and sexual demands, and increasing responsibility. He has lost a large measure of immediate emotional support from his family; he will encounter conflicting religious and moral viewpoints; he will be faced with a more definite occupational choice. In almost all of the phases of his college life he will face more intensive competition than he has previously experienced. What problem-solving

methods does he employ to maintain his own integrity and stability?

The field workers would like to know what kind of families and communities successful students come from. And once a student with a reasonably healthy background gets to college, what supportive elements does he find on the college campus? Why is it that if these supports exist on campus some students are able to utilize them while others are not? We believe this may have something to do with the student's ability to form meaningful friendships and with his ability to relate or to identify with at least some of his teachers. We can surmise that if the student has a healthy parent image he will be more likely to make a healthy substitute identification.

The first step in the program of the field group was to talk to a gathering of 500 senior high-school students to ask for volunteers to co-operate in the study. About 100 of the students responded. Of these, 40 students were chosen initially, and later the group was narrowed down to 20. This phase of the project has been completed, and now a series of interviews is in progress relating to the students' leisure time, their special achievements, their work habits and study techniques, their dating patterns, their interest in social, cultural, and political issues, and their reasons for having selected a particular college. The only step which remains to be undertaken before the close of this school year is the administration of a psychological test especially designed to elicit the student's unconscious anticipation of college life and the stresses he expects to meet there. The subject is presented with a series of pictures—not photographs, but an artist's conception of the college situation—in which some kind of stress is present. For example, one scene shows students taking a final examination, another shows a college couple looking in a window of a jewelry shop at engagement rings, and another shows a student just coming into a "get acquainted" party for freshmen. Still another shows a group of college athletes looking askance at a scholarly appearing student. The subject is asked to make up a story about each picture. It has been found that people tend to give more freely of their fantasy life through this kind of medium than through most other psychological tools. These twenty students will be followed-up by the re-

search team throughout the freshman year in their respective colleges.

Three methods of follow-up will be used during this year at college. First, the members of the field team will visit the campus to find out how the students are adjusting emotionally, socially, and academically. To make this evaluation, friends, faculty members, and the student himself will be interviewed. Secondly, the student will be asked sometime during the year to write his own reflections and observations about his experiences thus far in college. Finally, the student's family will be interviewed to get their slant on how their son or daughter is progressing. Of course both the inpatient and campus programs are pilot studies, and we expect that some changes in methods or goals will take place during the coming year.

Within the Clinical Center, as a complement to our studies of personality structure, we are also concerned with some of the important bodily changes that occur in psychological stress, particularly with respect to endocrine function. Our psychosomatic group is planning physiological measurements in connection with the work on emotional stress and adaptation in our college students. We hope to work out some of the emotional conditions under which the secretion of certain hormones is stimulated or inhibited. During the coming year we plan to work mainly with adrenal cortical and adrenomedullary hormones. These studies will be done on a group of normal controls, not on our students. However, we expect the studies to shed some light on the student's emotional problems. If we find that the mechanics of the study are not upsetting to the subjects, we may use them more directly in our college program.

For example, the psychosomatic group is studying the activity of the adrenal cortex as it responds to emotional stimuli by measuring the hydrocortisone levels in the blood and urine. One of our investigators is using this measurement in the study of dreams. This can be done by obtaining electroencephalograph and electromyographic records during sleep. The pattern of the brain waves and eye muscle movements indicates that the subject is dreaming (and incidentally our subjects have been having four to six dreams a night, each lasting from fifteen to thirty minutes). When each

dream ends, a buzzer rings and the subject talks into a tape recorder about the content of the dream and the feelings it aroused in him. The following morning, blood samples are taken to determine the hydrocortisone level.

Another method of approach is to show selected movies to the subjects and to take blood samples before and after viewing the film. An interview is held with the subject to determine his conscious emotional responses, and these are compared with the blood levels of hydrocortisone.

The group also plans to study adrenal medullary activity by obtaining blood and urine levels of epinephrine and norepinephrine, and later to develop satisfactory techniques for the study of thyroid hormone production in response to emotional stimuli.

The workers in the three related research programs will try to integrate their findings in order to provide the broadest possible understanding of a student's adaptive processes. It is hoped that this information will in time be useful to high schools in providing guidance for their future college students. Just as any type of preventive medicine is more economical in the long run, so a more adequate method of preparing students for the expected stresses of college might result in fewer serious emotional crises. Also, a thorough awareness of student difficulties will assist the colleges in instituting preventive measures which could provide support for students who may demonstrate early symptoms of distress.

We hope that our studies will be of practical value, but aside from this consideration we may be able to generalize a bit further. As I mentioned at the outset of my discussion, our interests go beyond the limited group we are presently studying. We have asked a question, "Why does latent pathology evidence itself at particular times in life?" Possibly we shall find that the college student's difficulties in adaptation and his efforts at solving them are also applicable to other crises of living. In any event, we hope that our research will call the attention of thoughtful workers in several fields to factors that may help or hinder personality development during periods of major and often quite stressful transition.

The Student Health Service and Admission Procedures*

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THIS paper is an effort to clarify the purpose of a university health service as it relates to admission procedures. An admission committee justifiably asks the medical department to perform an important service, but it can be difficult to determine the best way to fulfill these medical responsibilities.

By sponsoring a health service, educators show their acceptance of the ethics that govern a physician's relationship to those he serves. These ethics stem from a fundamental respect for each individual and his capacities for growth. When doctors and educators work together with a mutual understanding of purpose, there is a helpful catalytic effect that reduces the obstacles many students find in the path to their educational goals. The total purpose and function of a health service is reflected in its relationship to admission procedures. Often this has been an ambiguous relationship, and the physician has failed to help the educator formulate the best procedure.

The university admission committee carries a great responsibility. It needs wise and experienced committee members who know the considerations important in evaluating prospective students. Most schools with university status center their admission policies around the basic function of the institution; i.e., they want students who are most capable of responding to their teaching

* This paper expresses the personal opinions of the author and does not necessarily represent the attitudes of other members of the Harvard Health Service staff.

efforts. Decisions about admission are often related to an applicant's past academic achievements and performance on various aptitude tests. General personality characteristics are given weight at times, and an interview may be requested to help determine social assets, motivation for study, or adaptability to a special field of study. The qualities that determine eligibility for admission will vary from one college to another and show marked differences among graduate schools of the same university.

Educators know the importance of opportunities offered by a university, and they try to keep the selection of students independent of the many social labels so often associated with attitudes of the prejudiced mind. As an admission committee makes every effort to select students believed to be best qualified, however, it finds some matters unrelated to academic competence that must be evaluated. Such considerations usually do not determine a long-term policy on admissions, but nevertheless they are practicalities that may not be ignored. Ability to meet educational expenses is a good example. Most universities provide scholarships, loans, and appropriate jobs in an effort to reduce the effect financial difficulties can have on selection of students.

When a competent health service exists, decisions about admission can be made without special reference to medical matters. Meeting the demands of the admissions committee, in itself, covers the only appropriate medical screening. Far from being an avoidance of admission procedures, this arrangement allows the health service to co-operate in the most responsible way. The health service can fully support the judgment of admission committee members by always giving them assurance that current and future medical problems of the candidates they select will receive adequate therapy. There is then no need to render necessarily uncertain guesses about the future medical problems of applicants who are qualified in the eyes of the admission committee.

Although this way of assisting in admission procedures represents a long-term goal that cannot always be achieved, it is an application of basic medical principles to the work of a university health service. There are many occasions when it is important to share medical information with university administrators. This is often requested by the student, always has his knowledge and ap-

proval, and can be of great value as a student resolves a difficult health problem. We must look with care, however, at the confidential nature of medical matters. When material is clearly viewed as confidential, it cannot be given as data to be used by a decision-making admission committee, no matter how high an order of abstraction is used to translate the confidential information. When confidential matters are pertinent to an admission decision, they will usually have been expressed in material readily available to the admission committee.

Medical practice should not be instrumental in depriving a qualified student of the opportunity to pursue all that a university offers. Indeed, the function of medicine is just the reverse. It makes every effort to eliminate or minimize health problems that limit a student as he pursues his education. Those students presenting a severe or unusual medical problem need to be viewed as an important challenge to the health service and not as students to be ruled out.

The attitude behind this general policy must be fully understood by the university administrators and cannot be presented in the form of a refusal to discuss medical matters with the admission committee. There will be times when the recommended procedure cannot apply. Possible exceptions would be applicants who have acquired a severe medical problem during the short interval between the time they completed the work to be evaluated by the admission committee and the time of the actual admission decision. To disqualify an applicant for admission the illness would have to have produced irreversible changes that clearly interfere with the academic ability shown in the original application material. An accident or severe progressive disease can produce such changes, and an admission committee needs to know the applicant's ability to continue studies. The health service must make every effort to provide sound medical information when these occasions occur.

Although medical ethics is primary in any medical consideration, practical matters demand attention and must be heard. In an article titled "Health Forms and Student Health Services" John S. Hathaway, M.D., of the Yale Department of University Health, stressed the importance of the adequacy of a health service:

The best health criterion for selection lies completely outside privileged professional sources, in the candidate's work record—its quality and his regularity of attendance. . . . Much of the failure in present selective methods arises from forgetting that health is a constant on-going process. Health failures are not usually due to inadequate past selection but rather to inadequate health facilities available to the individual in his new position.[1]

A valuable first step of an adequate health service is to send a complete and confidential medical questionnaire to all who have been admitted to the university before they enroll. Free of a concern that his answers might jeopardize admission, the student can give complete medical information. Some returns may tell of medical matters that should be thoroughly evaluated before the student enrolls. This would allow the health service to make arrangements for appropriate therapy with the least delay. There may be occasions, e.g., on finding unresolved tuberculosis or a very recent psychotic episode, when the health service will want to recommend a delay of enrollment, at the same time making specific recommendations for the therapy that is indicated. The health service would then continue its contact with the student to help determine the appropriate time for enrollment. It must be emphasized that a delay of enrollment to attain a state of health compatible with study is quite different from a rejecting denial of admission.

Let us consider the students who might be admitted and have a severe and permanent disability, such as blindness. To qualify for admission with such a handicap, the student usually has been able to compensate for his limitations by superior accomplishment in areas where his capabilities can be expressed. It would be appropriate for the health service to assume responsibility for practical arrangements that would assure a college adjustment with the fewest restrictions. Some universities have the motivation and means to make special efforts to manage this type of problem. A few universities have even reversed the long-standing assumption that being bedridden rules out an otherwise qualified student. By means of two-way radio equipment, the student becomes a participant in the classroom and has direct contact with his teachers.

[1] *Student Medicine, 5:* 21–24, 1956.

Psychiatric needs are a serious responsibility of the student health service. Psychotherapy always includes material that must be considered confidential, and a university may tend to view students associated with a psychiatric problem as an "unknown" to be avoided whenever possible. Two recent psychiatric studies at Harvard University throw a practical light on this part of health service work. In the first study the psychiatric needs of foreign students were reviewed.[2] Harvard offers an opportunity to study a significant number of students from the major cultural areas of the world. A total of over fifteen hundred foreign students were studied and compared with domestic students. A summary of the findings included the following:

There is no indication that one can anticipate and so "rule out" the students, among those eligible for foreign study, who will develop psychiatric needs. . . . The factors which contribute to a need for greater self-understanding appear to be the more personal aspects of a student's life, instead of the general aspects, such as cultural background or field of academic interest. The study also suggests that dynamic psychotherapy, as practiced in this country, deals with material of sufficiently basic importance to be appropriately and beneficially applicable irrespective of the culture in which the student was reared. . . . Those students eligible for foreign study show no unusual tendency toward or away from psychiatric needs.

The second study reviewed one hundred graduate students who had received help for psychiatric needs.[3] They were compared with students who had not required psychotherapy, with the following conclusions:

Nothing in the information on a student's general background significantly predicts a need for psychiatric assistance. [This included a consideration of academic background, field of study, cultural background, family history, sibling position, and medical history.] . . . If students qualify for admission to a graduate school, no information routinely requested identifies the majority of those who will need therapy. . . . The study indicated that a complete and competent medical evaluation after the student has begun his graduate study can have considerable value.

[2] R. L. Nelson, The Psychiatric Needs of Foreign Students, *News Bulletin, Institute of International Education, 33:* 13–17, 1958.

[3] R. L. Nelson, Psychiatric Needs of Graduate Students, *School Rev., 67:* 93–105, 1959.

The medical evaluation not only anticipates the psychiatric needs of a significant number of students but can also have value in helping them arrange for therapy with the least delay.

These studies further emphasize the importance of an adequately staffed health service. An isolated college with a limited medical department may have great difficulty meeting the students' needs and may be forced to make more frequent requests that enrollment be delayed or study be interrupted to arrange the appropriate therapy.

Although incidental to the ethical matters discussed earlier, it is of practical interest to estimate the incidence of difficult medical problems in relation to admission proceedings. When asked to what extent medical problems become of significant concern to his admission committee, the Dean of Admissions at Harvard College estimated that ten applicants from a total of more than four thousand present medical problems that might affect the admission decision. When only a fraction of 1 per cent of qualified applicants have medical problems viewed with concern, it is reasonable to conclude that given a free hand about medical matters, an admission committee is not going to convert a university into a large infirmary or rehabilitation center.

The way a student health service co-operates in admission procedures is reflected in the general nature of communications between the admission committee and the medical department. An admission committee must modify its basic admission standards when it is forced to make the following type of request: "An applicant we want to admit gives a history of mental illness. Please evaluate his record, arrange an interview if necessary, and give us information that will help determine whether or not we will admit him." But a communication from an admission committee that represents an ideal goal of health service function might be as follows: "We have just admitted a well-qualified student. We learned that he has had a mental illness and is receiving psychotherapy. We suggest an early evaluation of his needs to help him arrange for whatever continuation of treatment is indicated."

The following reference to admission procedures in an annual report by Sholem Postel, M.D., director of the Radcliffe College Health Service, makes a poignant summary:

The proper definition of the preliminary medical credentials [for admission to college] is a device for anticipating the medical needs of students, even to the extent of looking after one with a known fatal or incapacitating illness. To deny such individuals pursuit of their image of fruition in the study of Greek or philosophy constricts, indeed, chokes to death, the democratic humanistic tradition in higher education. The responsibility of the University Health Services is to help such people, knowing that in doing so it reaches its greatest heights.[4]

The relationship to admission procedures exemplifies the way a health department can best serve the basic work of a university. The physician, in his primary professional role, allows the academician to function with the fewest compromises imposed by medical illness. Dana L. Farnsworth, M.D., has even reported the end of a medical administrative task often considered unavoidable.[5] Referring to medical excuses from class and examination, he states:

At the Massachusetts Institute of Technology the entire system has been abandoned. The instructor, with the advice of the dean in rare cases, acts as the judge. He bases his decisions on the general record of the student and does not emphasize the immediate illness, though in cases in which there is doubt he may check with the health service to see if the student has been there for treatment.

The medical problems of students do not need to be a primary concern of university administrators and faculty members when they can have confidence in the capable therapy and responsible attitude of their health service. The medical department has much to offer as it contributes to a supportive foundation of the greater university program.

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[4] Annual Report of Activities of the Radcliffe College Health Service for the Academic Year, 1957–58 (unpublished).

[5] D. L. Farnsworth, The Relationship of a Student Health Service to Other University Departments, *Student Medicine, 2:* 4–13, 1953.

Urological Injuries in Athletic Medicine*

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DURING the past few years there has been a growing awareness of the importance of athletic injuries in general. Better appreciation of the incidence and the ultimate meaning of these conditions has led to improved safety methods. More careful thought has been given, not only to the question "How soon can this player be returned to activity?" but also to the question of the eventual welfare of each player as an individual.

The genitourinary tract is a particularly important area to be considered in this light because the kidney performs a function vital to the human economy and because this highly vascular and specialized organ is very susceptible to injury, both direct and indirect.

Before we consider this important aspect of renal injury, let us briefly review some of the injuries which may occur to other parts of the genitourinary system.

INJURIES TO THE SCROTUM AND ITS CONTENTS

Injuries to the scrotum and its contents in athletic activities are common. Many players have had the experience of being struck in the scrotum, as, for example, by a baseball which has taken a

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bad bounce. The shocklike state which occurs after a scrotal injury is reflex in nature and is due to the extreme pain involved. For prevention of such conditions, various apparatuses have been suggested, such as the aluminum cup and the ordinary athletic supporters in common use. In general, it would seem best not to fix the scrotum too firmly in any one position because it then is more easily injured. Practical application of this principle is noted in cases of undescended testicle. At times, surgical exploration shows that the organ is outside the external inguinal ring, but that the vascular structures are so short that the testis cannot be brought down into the scrotum. It is considered better to remove such a testicle rather than leave it in a fixed position in the groin, where it is more susceptible to trauma.

The treatment of a player who has suffered an injury to the scrotum is familiar to you all. The patient is made to lie down. This helps to take care of the shocklike state. The maneuver that we commonly see used by trainers, flexing of the thighs and knees, is effective in that the injured scrotum and testicles are elevated. This frequently provides relief. Since it is impractical to disrobe a player on a football field or on a basketball court in order to elevate the scrotum, the above procedure serves well.

Hematoma of the scrotum is rather unusual, due to the scrotal mobility we have mentioned. When it does occur, management includes bed rest, elevation, and most rarely, surgical drainage if infection supervenes.

Torsion of the testicle may occur during athletic events. This brings to mind the case of a young school boy who had been doing nothing more than running very fast with many twists and turns. He developed pain in the scrotum which did not subside with ordinary measures. Unfortunately, the possibility of torsion was not kept in mind. When he was seen about three days later, the scrotum was enlarged, tender, and red. The working diagnosis at that time was still epididymitis. Operation revealed, however, a gangrenous testicle which had to be removed.

Early untwisting of the spermatic cord will save the testicle in these cases, but the time limit is narrow, and ideally it should be

done within a couple of hours. Each hour that passes up to six to eight hours compromises the life of the testicular tissue.

I would like to make another important point here; our experience has shown us that *partial* relief may be obtained by manually untwisting the testis carefully in the emergency room. Do not be deceived by this apparent improvement. The patient may feel better, but only one of the turns may have been unwound and it is far safer to explore every one of these cases. The spermatic cord may still be twisted several times and the circulation still impaired. We had one lad who had already lost one testis as a result of marked atrophy secondary to nondescent. When he was seen with a torsion of his only remaining testicle, we produced what seemed to be substantial relief, by gently untwisting the cord. However, due to the fact that this was his only remaining testis, exploratory operation was done anyway as soon as the operating room could be prepared. This showed that there were still several twists of the cord and the circulation was still much compromised. Normal color did not return until the cord was completely unwound. We were certainly glad in this case that we had not taken the temporary relief for proof that the circulation had been restored. This testicle was saved.

We must keep another condition in mind when we hear of a player who has been in an athletic encounter and has developed a swollen scrotum. The incident may simply have brought attention to a pre-existing abnormality. Many of these turn out to be ordinary hydroceles, spermatoceles, or varicoceles. Careful questioning usually reveals that, while a blow has been received, there is no other external evidence of injury—neither ecchymosis nor discoloration and the pain was only transitory.

The most serious condition which falls into this group is illustrated by the case of a young man who thought he had injured his testicle during a wrestling meet. Physical examination revealed no external signs of injury. The testicle was enlarged, firm, and not tender. It did not transilluminate. Operation disclosed that we were not dealing with an athletic injury, but with a malignancy of the testicle, which later proved fatal.

INJURIES OF THE URETHRA AND BLADDER

Injuries of the urethra and bladder are uncommon in ordinary college athletics. However, if a patient has been injured very severely and has any evidence of fracture of the pelvis or any bleeding from the urethra, one must consider injuries to these organs. A severe blow in the perineum can rupture the urethra. However, this injury is seen most often with straddle injuries in industrial accidents.

INJURIES TO THE KIDNEY

During the last twelve years in Ithaca, we have had twenty-five instances of kidney injury incurred in athletic activities among our college and high-school students. These have ranged from the very mild to the very serious. Fortunately no deaths have occurred.

It is difficult to estimate a statistical "injury per player hours" figure but one may gain an approximate idea. The average total number of players at Cornell, Ithaca College, and Ithaca High School engaged in football alone was three hundred each season. From this figure we can see that kidney injuries occurred infrequently. Nevertheless, with so many participants, they occurred often enough to teach us that we should be ever on the alert if these injuries with their possible serious consequences are to be recognized and treated well.

The approach I would like to use in discussing this type of athletic injuries is based on our trying to picture in our minds the anatomy of the kidney and why its structural characteristics make it susceptible to trauma. Also, we shall endeavor to visualize how the normal kidney is affected by trauma, and how these changes produce the telltale symptoms and signs which aid us in diagnosis. If we understand these things clearly, we shall have a ready guide for recognition and management of these conditions and an understanding of what the future might bring to these injured players. This will serve us better than any rule of thumb we may try to employ.

The kidneys are ordinarily quite well protected when they are in their normal location. They are cradled between the heavy

back muscles and the lateral abdominal musculature in the flank and seem to be encased in the shell of the lower part of the chest cage. Perhaps the fact of this protected position can be brought out more clearly if we consider the difficulties encountered in an ordinary surgical exposure of this deeply placed organ. Even after the patient has been placed in the "kidney position" on an operating table, with the flank extended as widely as possible, we find that our incision brings us only to the lowermost part of the kidney and freeing of the upper pole is frequently a tedious and difficult job.

Why then is the kidney so easily hurt when it is protected so well? We find one of the answers to this question in the very friable tissue of which the kidney is composed. The parenchyma is not tough but tears easily and fragments, very much as liver tissue does. If one has seen a surgeon attempt to suture the renal substance itself, he will recall how the stitches cut through with the slightest tension, so that fat pads have to be used under the stitches to enable one to draw them snugly without cutting the kidney. This friable nature of the renal substance is the underlying reason for the severe injury we know of as "fracture of the kidney," in which the renal mass is actually found to have shattered or fragmented, like a piece of delicate china. At operation, in one of our cases, a good portion of the kidney was actually found floating free in a pool of blood.

Another reason for the ease of injury is found in the physiology of the kidney. Through its substance there is constant passage of a great volume of blood undergoing the filtering and "purifying" process. This engorges the kidney so that an indirect blow may damage it considerably. This effect is similar to the contracoup injury which the brain suffers under certain circumstances.

Further, the kidney is attached and anchored in the body mainly by its own vascular supply. It has no other real support except the perinephric fascia. As you know, this fascia is "open" below, as we see in the clinical "dropped kidney." When sudden blows are sustained, these main kidney vessels, especially the renal veins, may be torn, with subsequent severe hemorrhage.

Still another significant anatomical fact is the division of the kidney into the collecting and secreting portions.

How the Kidney Is Affected by Trauma

Let us consider briefly the extent of some of the injuries sustained by the kidney in accidents on the athletic fields.

Contusion of the kidney is the least serious. In this group, the collecting system and the parenchyma are intact, but some hemorrhagic areas are found in the pelvis, from which varying amounts of blood find their way down the ureter. We can tie into this lesson some of the previous studies which have been done, for example, the well-known Duke University study in 1955.[1] Urine samples were taken from football players before and after contact activity. The investigations showed that many of the players developed a transitory hematuria. The authors concluded that a microscopic hematuria was not enough reason to restrict activity. They decided that even gross bleeding, if it subsided within twenty-four hours, was no reason for keeping a player from contact activity, though I personally would want to be very sure in a case of this kind. Kleiman, a urologist who reported recently about his studies on boxers, likewise showed that a good deal of microscopic hematuria occurred in his subjects.[2] He studied a great many samples before and after bouts and also administered loin blows to a group of volunteers. This simulated the trauma suffered in the ring. He did intravenous pyelograms on a good many of these men and found that there was, in general, no serious long-term effect. He observed, however, that blood in the urine *found before the trauma* almost invariably signified some renal defect. A corollary of this is that if the hematuria persisted for some time *after* it should have subsided, *some underlying condition of the kidney should be suspected.* We may thus conclude that mild contusions of the kidney are extremely common in any contact sport. The degree of damage to the renal parenchyma is probably negligible; however, the net effect of repeated small traumata must be considered.

Laceration of the kidney substance occurs when the traumatizing force is greater. Here, the kidney substance is torn, and the pathological changes will depend on whether the tear extends into the collecting system or only into the perineal space. When the tear

[1] A. W. Boone, E. Haltiwanger, and R. L. Chambers, Football Hematuria, *J.A.M.A., 158:* 1516–1517, 1955.

[2] A. H. Kleiman, Hematuria in Boxers, *J.A.M.A., 168:* 1633–1640, 1958.

does involve the collecting system, blood and clots may appear in the urine. If the collecting system remains intact despite the injury, then the urine may remain clear. There may, however, be bleeding from the parenchyma into the space around the kidney. Such bleeding may assume large proportions, with gradual accumulation of a huge hematoma. This is the process which accounts for the finding of a large mass in the flank or even in the abdomen, for the peritoneum is pushed anteriorly by the accumulated blood mass. This also accounts for the valuable x-ray sign of *obliteration of the psoas muscle shadow*. The blood in the retroperitoneal space obscures the edge of the psoas muscle on the plain x-ray film. If bleeding into the perirenal space occurs slowly, we have the *delayed* symptomatology which we saw in our cases several times. If the vessels involved are large, then the whole clinical picture is speeded up. This applies also to injuries involving the collecting system. Accumulations of blood gradually have a tamponade effect if the vessel is not too large and bleeding thus spontaneously ceases. Two additional dangers follow, one immediate and one delayed. The immediate danger lies in the fact that when one does operate, the release of the tamponade will frequently result in recurrence of severe bleeding, which may be very difficult to handle and is probably one of the greatest risk factors involved. The delayed danger lies in the fact that such a mass of accumulated blood, if undrained, may later cause constricting of the upper ureter, with hydronephrosis and kidney damage or in rare instances a Goldblatt effect on the kidney with resulting hypertension in later years.

Fragmentation and shattering of the kidney occur with the most severe trauma. Here the renal substance is frequently found to be separated into several fragments, with involvement of major vessels and massive bleeding.

The Mechanism of Kidney Injury in Athletics

How do players sustain their kidney injuries? Kidney injuries occur most often when a player is throwing a block. His torso is extended, and he is placing his side directly in the path of either a churning knee or some other hard and fast-moving object, as a head or shoulder. The degree of force generated by this type of encounter can be seen to be very great. Such a direct blow in the

flank is a frequent cause of kidney injury; however, at times a kidney may be ruptured by a blow in some other part of the body, for example, the anterior abdominal wall. This may occur when the kidney is congenitally misplaced. We had one such patient who had a horseshoe kidney. This lad was playing basketball and had jumped up for an out-of-bounds ball. He came down and was struck by his opponent's knee in the right lower abdomen. The indirect blow served to fracture the isthmus of the horseshoe kidney and the patient developed a very large retroperitoneal hematoma, which was fortunately recognized and treated appropriately.

Another mechanism of injury was noted in the case of an end who was jumping for a pass and was hit as he was coming down. The blow received in his flank while he was in this extended position resulted in a very severe laceration of the kidney.

A young back, playing safety, had just taken a kickoff and was about to start down the field. He was struck by several players in different directions and immediately complained of severe pain in his flank. At the hospital the outstanding clinical findings were those of severe pain as well as the passing of large amounts of bloody urine with some clots. Operation in this instance revealed that the kidney had been completely bisected. The tear extended from the lateral margin, completely through the renal substance, into the region of the vascular pedicle. A large area of renal infarction had developed. This particular kidney was removed, and bleeding was controlled.

Delayed symptomatology due to serious injury was demonstrated in the case of a guard who was "loafing" immediately after a play. He was struck in the left flank by another player who did not realize the play was finished. The injured player did not pay much attention to the incident. He continued in the practice session with the rest of the players, took his shower, and had his supper. He had even gone to the movies that evening. However, he noticed increasing pain which became progressively worse. When he was seen the next morning, after a restless night, he apparently had a large retroperitoneal hematoma. His side was splinted and tender. There had been very little blood in the urine. Pyelograms were done, which showed obliteration of the left psoas shadow and evi-

dence of displacement of the left kidney. Operative exploration revealed a small tear in the renal parenchyma near the pedicle, but from this a great deal of bleeding had occurred. The retroperitoneal space had filled with hematoma and clots extending down almost to the true pelvis. A good recovery followed after drainage of the area and the suture of the laceration in the kidney. The kidney was not removed. Another college player suffered injury to his flank after a block. This resulted in gross urinary bleeding. Intravenous and retrograde pyelograms showed no evidence of extravasation outside the kidney, and the bleeding subsided with bed rest. This represented a laceration of the kidney which was mostly intrarenal, with blood coming down the collecting system and no apparent perirenal accumulation.

Another young football end suffered a severe blow to his flank during a block. He passed a great deal of blood, and then continued to do so over a period of several days. Retrograde pyelography showed extravasation of the dye outside the kidney. However, operation was not carried out, inasmuch as his vital signs seemed to be sustained. He did quite well with general supportive treatment and with blood transfusions. Follow-up studies were done over a period of several years, because there was evidence of dilatation of an upper calyx on the side of the injury. This, however, gradually improved. When he was last seen, he had no symptoms. His urine was entirely negative.

Another football player had had a previous severe contusion of his left kidney and had been warned that he should not play anymore. This advice was disregarded and after coming to college in Ithaca he again participated in contact sports. A recurrence of severe urinary bleeding followed after a simple contact with a dummy during a practice session. In this case, the bleeding subsided with bed rest. Repeat studies showed evidence of residual damage in the kidney and he was finally discharged with urgent advice not to participate in any contact sports again.

Principles of Diagnosis and Treatment

Under this heading, let us consider practical suggestions for the management on the field and subsequent care of a player who may have suffered a kidney injury.

In studying this possibility, just how the blow was sustained is important. If the patient is able to tell us how he was hurt, or if we can obtain this information from the trainer, coach, or other players, we may gain important clues as to the degree of force involved and in turn as to the possible severity of damage.

What should we look for on the field? The general condition of the player may indicate a shocklike state. He may complain of pain in his side. The side should be felt through the clothing, and if tenderness is elicited kidney injury should be suspected. The patient should be removed from the field on a stretcher, even if he is opposed to this. He should not be allowed to walk, because if kidney injury is present it may easily be made worse.

After the injured athlete arrives at the infirmary, what should be done? First, a further evaluation of the general condition is important. Physical examination may reveal, again, tenderness or rigidity in the flank. The blood pressure must be taken at frequent intervals. The urethra must be inspected for evidence of gross bleeding and the patient encouraged to void so that an idea may be obtained of the status of the urine. Blood typing and cross matching for at least 1,500 to 2,000 cc. of blood should be immediately performed. Sedation for pain is indicated, but the patient should not be snowed under too deeply because one needs to be able to interpret the vital signs without too much central nervous system depression. If the pain is very severe, extensive injury is usually present. In cases like this, the retroperitoneal tissues are being rapidly distended by fast accumulating hematoma, and this gives rise to the severe pain.

After shock has been combatted, often by transfusion, and the patient's general condition permits, further studies should be done. The most important of these is intravenous urography. With today's improved urographic media, this diagnostic method is of great value and should be freely used. One must be especially careful if there is a history of severe allergy, especially asthma or hay fever. Nevertheless, in any case, one must weigh the advantages of obtaining much needed data against the risks of any reaction to the dye. This decision must be an individual one for each patient.

Why is intravenous urography so important? In the first place, it tells

us how badly the kidney is embarrassed in its function and whether or not there is a normal kidney on the other side. On the plain film we may find obliteration of the psoas shadow. This would suggest strongly an accumulation of blood and urine in the retroperitoneal space, indicating a probable laceration of the renal substance. If no dye is seen on the affected side, this may be the result of obstruction of the collecting system by clots, although we know too that the "shaken up" kidney may fail to secrete dye. Such a one will later resume normal function, but this cannot be presumed at first. Loss of continuity of the collecting system may allow some of the dye to extravasate outside the usual area. A delayed film is often helpful.

The problem of whether or not retrograde pyelography should be done is one which must also be decided in each case individually. If one seems to have enough information to reach a conclusion, there is no need to cystoscope the patient. However, if there is doubt as to just how bad the injury is or if intravenous pyelograms cannot be done because of severe allergic state, and if the added information is necessary to decide whether or not an operation is indicated, then one should not hesitate. Cystoscopy can be very safely done in the modern hospital or infirmary. A well-given pentothal induction anesthesia with plenty of oxygen minimizes the risk still further.

After these diagnostic tools have been employed, one can see into which clinical category of injury this particular patient may fall. This grouping is only a rough clinical guide, however, and it must be emphasized again that each case must be individually considered.

The first group is that of "contusion of the kidney." Here, the findings on intravenous pyelography may show interference with function in the injured kidney but the psoas shadow is clear. A retrograde pyelogram may indicate no extravasation of dye from the collecting system. Blood may have been noted in the urine but usually soon disappears, and the patient is relatively comfortable throughout.

The second group is that of "laceration of the kidney." This includes patients who show, in addition to the above, sharper pain and more pronounced urinary bleeding. A mass may appear

in the flank and become progressively larger and more tender. The psoas shadow is obliterated indicating considerable perirenal hemorrhage. If the collecting system has been disrupted, the pyelograms, intravenous or retrograde, may show extravasation of the dye either around the ureter or out into the perirenal spaces. These patients look sicker and may have had a greater degree of shock.

The third group is that of severe laceration and hemorrhage, with all the signs pointing to a shattered kidney. These patients are the ones who look the sickest, complain of the most pain and whose shock is difficult to combat despite repeated transfusion. They may pass large amounts of blood with many clots. At times the accumulation of clots makes it impossible for them to void, and they develop acutely distended bladders with marked suprapubic distress. An appearance of restless agitation is noted, which does not respond well to sedation in the usual amounts. The x-ray changes in this group may indicate marked extravasation into the retroperitoneal space, and marked tenderness in the flank is the rule. If the bleeding is mostly down the ureter, there may be little if any flank mass.

Treatment

In general, one must keep in mind that survival from injuries to the kidney is the rule and not the exception. Each individual patient, however, must be carefully considered on the data in his particular case. *There is no easy rule of thumb.*

The first group of patients are at one end of the treatment spectrum; no operation is indicated. Bed rest for at least ten days, with general supportive measures, is advised. We need to emphasize this point. It too frequently happens that as soon as the bleeding subsides, there is immediate pressure upon the physician from the player himself and from others to let this patient up out of bed and get him back to activity soon. We must resist this pressure and insist on the bed rest. There is a good deal of risk in the simple matter of too early ambulation in these cases, and if we keep the anatomical facts in mind we shall have a firm basis for our recommendation of bed rest. We had one instance in our hospital cases in which urinary bleeding seemed to subside promptly. The pres-

sures mentioned above developed, and the patient was allowed up prematurely. He promptly began to bleed again, much more profusely, to the extent of urinary retention due to large clots. The net result was a prolonged hospitalization with nephrectomy for control of bleeding being only very narrowly averted.

At the other end of the treatment spectrum is the patient who is evidently becoming progressively worse and on whom operation must be undertaken as a life-saving procedure.

It is in the in-between group that the most difficult decisions face us. Some of these patients will recover without operation. Others will run long courses marked by recurrent hemorrhages and fever. In selected instances some of the in-between-group patients will require surgery 48 to 72 hours after injury. Usually if the vital signs can be well sustained and the bleeding shows evidence of subsiding, further conservative treatment is justified. Repeat pyelograms are invaluable in following these problem cases.

What about Later Care?

It is pertinent at this point to mention that every patient who has had more than a slight kidney contusion should have follow-up studies. Intravenous pyelography is a minimum, because stone formation, hydronephrosis, chronic pyelonephritis, and hypertension have been known to occur as late results of kidney trauma. Any patient who has had a kidney removed should never be permitted to engage in contact sports again. Such an athlete must be encouraged to change his attitude, and while not needing to consider himself an invalid he should be made to understand the importance of avoiding injury to his only remaining kidney. Even a kidney which has been only severely lacerated and did not have to be removed is much more susceptible to further injury, and in my opinion the same "no contact sports" restriction should apply.

SUMMARY—WHAT HAVE WE LEARNED FROM OUR EXPERIENCE?

In this presentation we have reviewed scrotal injuries and noted that these are usually not serious. However, the possibility of tor-

sion and of the unveiling of pre-existing conditions must be kept in mind.

Renal injuries are common enough to make a high index of suspicion necessary. We have learned that the kidney is highly vulnerable to injury because of its anatomical structure and its vascularity. It is of value to know the mechanism of injury, that is, how the trauma was sustained on the playing field. The signs and symptoms after injury vary according to the degree of trauma and whether the kidney is contused or lacerated, with or without involvement of the collecting system. There is need for careful diagnosis, utilizing pyelography, both intravenous and retrograde. The results along with other clinical data serve as a guide as to treatment.

Finally, we have tried to look ahead into the future of an injured player and have emphasized the importance of follow-up studies. Only thus can we discharge our obligation to each boy, not only from the viewpoint of his availability for early return to active athletics but more importantly from the standpoint of his over-all welfare and happiness.

Educating for Health through College Health Services*

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BEFORE we get into the specifics of the assigned topic, I believe it might be well to discuss in a general way the purposes and goals of health education—what is it we are trying to achieve through health education? I believe our main aim is the development of the "health-educated" person. Then logically we should ask, "What is a 'health-educated' person—what are his characteristics?"

The characteristics of the health-educated person are simply but explicitly stated in a significant report which is over twenty years old. This report was drawn up in 1938 by the Educational Policies Commission of the National Educational Association and is titled *Purposes of Education in American Democracy*.[1] This report outlines the objectives of education under four general headings. Under "Objectives of Self-Realization," one of the four, we find a clear statement describing the educated person as far as health is concerned. The health-educated person is described as a person who (1) knows the basic facts concerning health and disease, (2) protects his own health and that of his dependents, and (3) works to improve community health.

Leaders in education have looked to this report for guidance in developing curricula to achieve the stated objectives. Workers in

* Presented before the Section on Health Education, American College Health Association, Thirty-seventh Annual Meeting, Philadelphia, May 7, 1959.

[1] Washington, D.C.: Educational Policies Commission, National Educational Assoc., and Am. Assoc. of School Administrators, 1938, 157 pp.

the health field on the elementary-school, secondary-school, and college and university levels continue to use this report in planning health curricula which contribute to achieving this objective of self-realization.

Most of us are associated with colleges and universities in one capacity or another. Since we are staff members of educational institutions, we are morally obliged to contribute to the attainment of the educational goals of our respective institutions. Some of you in the audience are teaching health courses, and in this way you are making your contribution to the development of health-educated college students. Some of you are primarily concerned with college health services, which have as one of their main functions the maintenance of the health of students. These services, along with other supportive services, assist students to make the most of their educational opportunities during college and in addition provide situations and experiences which can contribute significantly to the achievement of the educational goals of our institutions. Health service activities, then, can and should be so planned and carried out that they be desirable learning experiences for students. Whether we are aware of this fact or not, students are learning something when they visit our health service. Perhaps I should define what I mean by "learning" lest I be accused of using educational jargon. Learning can be defined as a change in behavior as a result of experience, and when we speak of "change in behavior" we include such things as a change in the way we think resulting from increased knowledge, a change in the way we feel (attitude), or a change in overt behavior, such as the development of physical skills and habits.

When a student has a physical examination, a tuberculin test, or a medical consultation or experiences any other health service activity, he is forming attitudes about that activity, about the people with whom he has contact, and about the agency which is providing the service. If sound planning has taken place, the attitudes formed are desirable and satisfying to the individual and are positive in an educational sense. If sound planning has not taken place, the attitudes formed are more apt to be negative, creating a situation not at all satisfying to the individual. So actually we cannot draw a fine line of demarcation between health services

and health education. What the student learns in a positive way will depend upon how thorough we have been in our planning to make each health service activity a desirable learning experience for our students.

May I suggest that each health service staff member for each of his contacts with students ask himself three questions:

1. How can I assist this student in increasing his knowledge of health and disease?

2. What can I do to help him protect his own health, that is, in what way can I assist him in assuming more responsibility for his own health?

3. How can I help the student assume more responsibility in community health matters?

I believe asking ourselves these three questions will make us more aware of the many opportunities we have to do significant educational work in our health services. Of course, merely recognizing these opportunities is not enough; we must capitalize on them to make our contribution to the development of health-educated college students.

Perhaps I have spent too much time philosophizing on this topic "Health Education through Health Services"; but I believe it is both important and necessary that health service staff members be made aware of the opportunities they have to do educational work through their contacts. The fact that there is a health educator on our health service staff is adequate testimony that our director, Dr. Ruth Boynton, recognizes that there are educational opportunities inherent in health service activities and feels that a health educator can assist in making the most of these opportunities.

Physicians, nurses, and others who have direct contact with our student patients are carrying on educational activities as a part of their work. When their activities involve telling, informing, explaining, demonstrating, forming or changing attitudes, bringing about or changing some behavior pattern, and the like and they feel that their methods might be improved, the health educator has been most anxious to be of assistance.

In this connection, the health educator has given service in the following ways:

1. Exhibit and display ideas, design, and construction.

   a. Radiological health.
   b. Safety.
   c. Occupational health.
2. Visual aids for individual physician's offices.
   a. Eye department—to aid in explaining eye defects, etc.
   b. Gynecologist—feminine hygiene instruction.
   c. Internist—aids for diabetic instruction.
3. Educational pamphlets and literature for specific purposes.
   a. Mental health materials for certain psychiatric patients—given selectively by mental hygiene personnel.
   b. Materials on weight reduction, diabetes, heart disease, allergies, and many other subjects—given out selectively by clinic physicians and specialists.
4. Review of course outlines, course content, evaluation of tests, and suggestions for and procurement of visual aids for staff members who have teaching responsibilities.
5. Editing prepared speeches and articles for publication by staff members.
6. Editing and publishing the *Health and Safety Bulletin* for the section of environmental health and safety.

These are examples of types of services to staff members to assist them in their educational efforts. Now let me cite some activities which aim directly at the student who visits the Health Service at the University of Minnesota.

A. New Student Orientation

Each summer beginning about the first of August and continuing for a six-week period, an orientation program is carried out for some six to seven thousand prospective university students. This program is sponsored by the Student Activities Bureau and calls for each new student to spend two days on campus. During these two days, the new student takes various tests, meets his advisor, selects courses, and learns about the university. On one of the days, new students in groups of twenty-five or thirty visit the Health Service for their orientation to our service and to get appointments for the entrance physical examination. Each group is guided by an upper-class student sponsor. A training session is conducted for the sponsors a week or so before the start of orienta-

tion sessions. After observing the Health Service orientation a few times as conducted by the health educator, the sponsors take over the orientation for their groups.

From our point of view the orientation, which is the student's first contact with the Health Service, is very important, and we are most anxious to make it a pleasant and meaningful experience. Through this orientation we aim to do the following: (1) acquaint new students with services and benefits available to them through the Health Service; (2) give each student an appointment for his entrance physical examination which will take place sometime during Welcome Week, the week prior to the beginning of fall quarter classes; and (3) prepare the students for the entrance physical examination so that it will be a positive learning experience for them.

In the past we have found that many students reported for the entrance physical examination with many fears and misconceptions about it. The orientation session allows an opportunity to give accurate information about the purposes and nature of the examination, how it is carried out, its length, and other similar items of information. By the use of flip charts we take the new students pictorially through the various parts of the examination, explaining each procedure which will be carried out. Since people have a fear of the unknown, particularly when related to doctors and physical examinations, we believe this orientation relieves many of the anxieties and fears the new students may have about being examined by strange physicians in this new situation.

Much direct teaching is done at this time as well. Skin tests and immunizations are explained. (It is interesting to note that only slightly over 60 per cent of our entering students of a few years ago knew that the Mantoux test was related to tuberculosis.) Information is given on such examination procedures as the Snellen Eye Acuity test, audiometer test, exercise tolerance test, urinalysis, and blood pressure. An explanation is also given of the procedures that the physician will carry out during his examination.

B. The Entrance Physical Examination

To reinforce the instruction given during the orientation session, the student is given an "Examination-Guide" when he reports for

his physical examination. This guide includes information about the procedures that will be carried out at each station as he proceeds through the station-to-station-style examination. The guide, which was tested and proved to be effective, not only increases the student's knowledge about the physical examination procedures being carried out but also eliminates doubts about what is going to happen next. It assures him that he will get only a Mantoux test and a smallpox vaccination and not "20 shots," as some new students had been led to believe in the past.

The physical examination that the student gets during the week prior to the beginning of classes in the fall is the screening examination and is only the first half of the required entrance examination. Each student is called back sometime during the school year for the second half of the examination—the recheck examination. The recheck examination allows for a twenty-minute consultation with a physician, during which the findings of both parts of the entrance examination are reviewed with the student. The physician offers suggestions for correcting defects found, counsels students on habits of personal living, and advises them on measures to maintain and improve their health. We look upon the educational aspects of the recheck examination as a most important part of this examination.

Following the screening examination, it is of course necessary for the students to report back to have the Mantoux test and the smallpox vaccination read. With some six to seven thousand students reporting back for these readings, it would not be practical for a nurse to tell each student the results of the Mantoux test and smallpox vaccination and to interpret individually these results. So we have developed a small form on which is recorded the student's Mantoux test result and smallpox vaccination reaction along with an explanation of the significance of each. This is given to each student. At the time of the second reading, one week following the date of his screening examination, the student is given a combined tetanus-diphtheria toxoid injection. He is then given a small form, the "Personal Health Record," on which is recorded the dates of his various immunizations, the date and results of skin tests, chest x-rays, and so on. Space is provided on the form for the student to indicate whether or not he is diabetic and to list anti-

biotics, antigens, and the like to which he is sensitive. The student carries this record with him and presents it each time he reports for one of the procedures mentioned above. After the nurse records the date and the procedure performed, the record is returned to the student. The "Personal Health Record" serves many obvious functions, one of which is that it reminds the student to keep his immunization status up to date and to report back for his annual chest x-ray if he is a Mantoux reactor.

C. Waiting Room Reading Materials

On any visit to the Health Service, we make it easy for the student to "increase his knowledge about health and disease." In the six main waiting areas, we keep a generous supply of health literature in pamphlet racks. The materials made available cover a wide variety of subjects. The nature of the literature is varied with the time of year, with the kinds of problems being seen in the dispensary, and with regard to the particular campus-wide educational drive being conducted. Thousands of these booklets and brochures get into the hands of students in this way. We know that students are interested enough in these materials to take them; but whether they actually read them and act on the information contained in them, we do not know. With the measuring devices and evaluative methods currently available to us in public health education, it is almost impossible to appraise the effectiveness of the materials distributed in this way. We are sure the materials are doing some good, but we cannot say how much.

D. Miscellaneous Information Materials

I have already referred to one or two of the special informational forms and brochures which we use in our Health Service. Since samples of many of these are available for review following this session, I will only take a moment at this point to make a few general comments about them.

The health educator reviews all of the forms, leaflets, and brochures which are used in the Health Service before they are reordered. It is also his job to design and draft new forms and other materials which are needed. This gives him an opportunity to

incorporate educational matter into them when the nature of the material permits.

I should like to call your attention to just a few of these. At the orientation session, each student is given a copy of *Your Health Service*. This serves as a reference for the student and outlines the various health services and benefits that he is entitled to as a student at Minnesota. We feel that an important aspect of health protection and taking responsibility for one's health is the wise utilization of facilities and services available. In order for this to happen, one must first of all be informed of what these services and facilities are. We believe this booklet does this to a very marked degree.

A companion piece to this brochure is now in the process of production; it is titled *Your Hospital Guide*, designed of course for use by our hospitalized patients. This booklet will give the patient general information about hospital procedures and policies concerning such things as mail, availability of reading materials, visitors, use of the "call" button, smoking in bed, meals, chaplaincy service, blood bank, knowledge of progress, cost information, and follow-up after discharge.

We use forms to notify students of the results of certain tests and procedures which have been carried out. Form 98 informs the Mantoux reactor that his lungs appeared satisfactory on x-ray examination. In addition, it interprets the meaning of the positive reaction and outlines recommended future action for him both while he is at the university and thereafter. Form 99 gives similar information for the Mantoux reactor whose x-ray film showed a calcification, and Form 100 is used for individuals who are Mantoux negative but whose chest x-ray showed a calcification.

So far I have discussed some of the educational methods and activities which we carry out within the Health Service itself. Since our Health Service has been designated by our State Board of Health as an official local health agency, the health educator functions in our university community in a way similar to that of any health educator working in a local health department. Instead of working with and through community groups and agencies, the health educator works with and through the various university departments and student organizations.

Time will allow only the discussion of how the educator works with and through student organizations. At Minnesota, we do not have a campus-wide health and safety council as such, and it is not our intention to attempt to start one, since an organization already exists on our almost overorganized campus which performs many of the functions of a college health council.

The Social Service Council at Minnesota is made up of some thirty-eight members, most of whom are presidents or vice-presidents of other campus boards or councils. Such student groups as the following are represented: the All-University Congress, Associated Women Students, Education Intermediary Board, Foreign Student Council, Interfraternity Council, Nursing College Board, Medical Interfraternity Council, and Professional Fraternity Council. Groups of this kind number twenty-six in all on the council. Eight student members elected at large by the Council, a member of the Student Activities Bureau staff, and three faculty representatives recommended by the Council and appointed by the President of the University complete the membership on the Council. The Health Educator of the University Health Service is one of the three faculty representatives on the Council.

The functions of the Council as listed in its constitution are too lengthy to quote here, but to generalize we might say that the Council serves to co-ordinate all student-sponsored fund-raising and educational drives and other social service activities on the two University campuses. It receives requests to carry out hundreds of such activities annually; its job is to decide on which ones to sponsor, find sponsoring groups, give assistance to the sponsoring groups, and handle allocation of monies collected in fund-raising activities.

As pointed out, one of the functions of the Social Service Council is to assist sponsoring student organizations in carrying out campus-wide educational programs. Many of these are in the area of health. During this academic year so far, different student organizations have conducted health education drives dealing with diabetes (detection and education), tuberculosis (in connection with seal sale), the Red Cross (education and fund raising), heart, cancer, polio, and mental health. The health educator works closely with each of the sponsoring organizations on educational

drives related to health. He assists groups in planning all phases of the drive; he suggests educational methods and media, assists with obtaining educational materials, such as posters, leaflets, brochures and exhibits, and in other ways actively assists in carrying out these drives.

Perhaps a brief discussion of one of these drives will better convey the educational potential of these activities. This year a request was made by the National Foundation to the Social Service Council for a March of Dimes campaign. Since another agency had been awarded the fund-raising drive for the winter quarter, an educational drive was agreed upon. *Chimes*, a junior women's honorary organization, submitted a request to the Social Service Council to sponsor this drive. The Council approved *Chimes'* request. During the early part of November, the student chairman of the drive called the first planning meeting. This was well in advance of the week set aside for the drive, the week of January 19. Several meetings were held subsequent to the first to plan and carry out the program.

Some of the methods and procedures used in this program I believe should be of interest to you. Since this was not a fund-raising drive, the emphasis was changed from "March of Dimes" to "March for Polio Vaccination," and much of the informational and educational material was pointed in this direction. The following are the main methods and procedures which were used:

1. Articles and editorials in the *Minnesota Daily*, campus newspaper.
2. Spot announcements on the two campus radio stations WMMR and KUOM.
3. Distribution of leaflets and brochures in mailboxes in all dormitories.
4. Posters on all campus bulletin boards, including those in sorority and fraternity houses and in university buildings, in religious foundations and in store windows.
5. Two large exhibits—one in the main lobby of the Health Service and the other in the Student Union. (These were provided by the National Foundation.) Polio literature was available at each exhibit.
6. Noon hour film showings in the Student Union.

7. Two letters were sent to the almost two hundred dormitory counselors, explaining the drive and asking them to contact each of their students to check on vaccination status and urge starting or continuing the basic series of polio injections.

8. Letters were also sent by the student chairman to all instructors who were teaching health-related courses, asking them to announce the drive and to urge students in their classes to participate.

So you see, many educational methods were used in this drive—the mass media, individual contact, and other communication media that are peculiar to our campus. Many of the methods were suggested by the health educator; but the students also suggested some which are quite unique and new even to the health educator. We get new ideas from each drive; some of these are then used in subsequent drives.

Within two weeks of the completion of each drive, the sponsoring group must write a summary and an evaluation of the drive. This is submitted to the advisor of the Social Service Council in triplicate; one copy is for their files, one copy is sent to the agency concerned, and one copy is sent to the health educator if the drive involved health education. These reports are most helpful to sponsoring groups undertaking a drive for the first time.

I have tried to outline some of the educational opportunities and activities which are carried on both within our Health Service and through student organizations with assistance from a Health Service staff member. The health education opportunities on the college campus outside the classroom are almost unlimited. Our job is to find them and to capitalize on them; in this way we can supplement to a marked degree classroom efforts to develop "health-educated" college students.

Communications between College Health Services*

ALAN FRANK, M.D., UNIVERSITY OF COLORADO

IT has become fashionable to talk of communication, so much so that the study of communication itself has become an area of specialization complete with its own subspecialties. As a conceptual system it has found wide application in a great many previously established disciplines, such as advertising and electronics, and even in psychiatry, where it is to be found in linguistics and kinesics. In a somewhat less formal manner it has been with us in one form or another since before David treated Saul's depression in biblical times.

Now that it is fashionable to discuss many areas in terms of communication, I would like to keep my orientation broad enough to discuss physicians in general as communicators and then focus down on some of the related problems which embroil the campus physician and psychiatrist. I think that as physicians we are rather poor communicators and therefore at somewhat of a disadvantage in carrying on our work and in recognizing our responsibilities on our heterogeneous campuses. I want to sketch in a few of the thoughts which I think are responsible for this, point out some of the results, and make a suggestion or two toward overcoming this disadvantage.

There was a time, not too long ago, when the physician was an integrated and integral part of his community. This was, of course, before the invention of the typewriter, the radio, the airplane, polio

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vaccine—in other words, before the enormous growth in technical differentiation in our culture. A change which directly affects medicine as much as any other discipline. In medicine as a whole there has been an increasingly apparent withdrawal and isolation from the community which parallels to some extent, and perhaps is explainable in relation to, the enormous increase in content of medical knowledge needed to practice medicine today. The doctor, too, might almost be said to have become a specialized hermit in his technology. Although he has an increasingly diverse array of tools to practice medicine, it seems at times that he is more bewildered by this wealth than encouraged to test out its applications, particularly when it comes to new applications.

The difficulty here seems to lie in our conceptualizations of both the tools and their functions as well as of our own function as physicians. We are creatures of habit in our behavior and, as any psychotherapist can testify, even more so in our thinking. It seems to me, therefore, that while we have developed a great many new technical and conceptual tools, we have not done much about reexamining some of the older tools and concepts which we have always taken pretty much for granted. I am referring here to two ideas specifically: the first, which we learn more or less unwittingly in medical school as part of the implicit culture of medicine, is that "good" medicine is practiced in a one-to-one patient-physician relationship. The second, explicitly stated and legally sanctioned, is that what goes on in this relationship is inviolably confidential.

I do not mean to suggest that the physician should lose sight of or discard these two principles. The routine practice of medicine, as it had to be practiced at induction stations during the war, is as antithetical to me as would be the invasion of my personal privacy if my analyst were to dispense with the concept of privileged communication. I do believe that these concepts need reexamination if they are to continue to be useful in the practice of medicine. This is particularly true if they are to be useful in the practice of campus medicine and psychiatry with the young adult or late adolescent. At present I think our interpretation of these two concepts is a significant factor in our difficulty in communicating both among ourselves and with the social matrix in which we work.

There have been significant changes in our society with the advances in technical knowledge in all areas. With the increased knowledge and understanding of disease processes there has been growing opportunity, and indeed almost a demand, for a change in our conceptions of medical practice. Not too long ago hospitals were places where you went to die, doctors were for sick people, and, of course, psychiatrists were alienists. Now people are quite willing to go to hospitals, there is increasing interest in staying well, and some people even continue regular medical checkups after college (where they may have been exposed to some unusually good health education). On the medical scene preventive medicine is a recent arrival. In medicine we have discovered that disease is preventable and that health is not a luxury.

But a contradiction arises here because the broad field of preventive medicine does not lend itself to a comfortable one-to-one relationship with the patient. We are forced to think in different terms. These terms are the family, the community, the nation, and the world. On the campus the physician must think in terms of the living unit, the classroom, and the academic community as a whole if he is to utilize the new technology effectively for more than the mere treatment of the disease which may come to his office.

I am hesitant to introduce the term "social medicine" here, because it has occasionally been heard as "socialized medicine," and because it implies "social disease" (which has robbed it of many useful implications). But as campus physicians, the fact that we are practicing social medicine in a community is much more forcefully brought home to us than it would be if we were engaged in private practice alone. We are no longer private entrepreneurs in a laissez-faire society whose professional ethics happens to include rather stringent ideas concerning service and responsibility. Incidentally, these two concepts probably are the two primary reasons that we do not as yet have our own I.C.C. (Interperson Communication Commission).

The physician has been astonishingly slow to recognize and accept these changes in our social matrix and even slower in constructively readapting his concepts of medical practice to them. On the campus these changes are perhaps most clearly seen in the

increasing range of ancillary services offered to students. This growth is reflected not only in the existence, but also in the contents, of the student's personnel folder, as contrasted to his academic folder. The American university, then, is committed to a philosophy of education which goes far beyond that of the classic European university, which records only the payment of fees and the results of comprehensive examinations. This reflects a different concept of who shall be educated as well as a difference in how.

Among these ancillary services the physician is one of the early additions, having been around for slightly over one hundred years. This places him next in seniority to the individual responsible for student housing, I believe. But in that hundred years he has accomplished little more than a grudging acceptance of his services as a necessary evil: "someone has to see that the students stay reasonably healthy, but medical excuses for cutting exams only encourage students to try and get away with it." That this still remains a prevalent faculty and administrative attitude toward campus medicine indicates to me a serious lack of communication about what we are doing on campus and also about what we potentially could be doing.

It is just at this point that the psychiatrist has particular difficulty. He comes to psychiatry from his medical training bearing with him these convictions about concepts of privileged communication and a one-to-one therapeutic relationship. Then in his training in psychotherapy he is systematically provided with (to overstate it) an obsessional concern with the intrapsychic processes of his patient to the almost total exclusion of the patient's, or his own, social processes. It is sometimes said of the physician that he considers the patient a not entirely necessary complication in the treatment of disease. So it might be said of the psychiatrist that he sometimes behaves as if family and friends were unnecessary complications in his therapeutic endeavors. And further, as is being brought home to us today, we are isolated even from our medical colleagues: "the therapist speaks only to analysts, and the analysts only to Freud." [1] Karl Menninger has suggested that this may have something to do with the personality configurations of those

[1] R. T. Morse, A Serious and Little-Recognized Deficit in Post-war Psychiatric Residency Training, *Am. J. Psychiatry: 115*, 899–904, 1959.

of us going into psychiatry.[2] Be that as it may, our integration and communication with our medical colleagues are sadly deficient in relation to what they might be if we developed concepts which would permit us freer dissemination of psychiatry as a frame of reference for thinking about human beings in addition to its being a series of what must often appear to be magical techniques. This is doubly true in relation to our academic colleagues.

There are many ways and places in which a psychiatrist's point of view could materially contribute to a university. It is, for example, rare to hear of a psychiatrist as a consultant in administrative decisions and policy outside his own bailiwick, yet these decisions often have extensive implications for fostering or hindering emotional maturation. The psychiatrist is seldom involved in the planning of new living units, although we well recognize in principle that their size, design, and utilization encourage some kinds of behavior while discouraging others. Nor is the psychiatric point of view brought to bear in curriculum planning, extracurricular activities, and so forth. Rarely does one find a campus psychiatrist with more than a passive interest in the social matrix in which he works and from which his patients come. As far as we unquestioningly accept an homunculus theory of human maturation during adolescence, so much can we continue to practice campus psychiatry as if we were in private practice with adults.

Most schools now utilizing psychiatrists are beginning to become aware of the contribution that psychiatry can make beyond the clinic in dealing with the multiplicity of problems which arise on campus. I suspect one of the major problems faced by administrators is how to communicate with psychiatrists. In the area of discipline it has been my experience that administrators have been only too anxious to obtain help in arriving at solutions which are equitable to both the individual student and to the university—solutions which will help the student mature. They are frequently well aware of their limitations in understanding what will be truly helpful to the student in growing up. Beyond what I see to be the potential therapeutic benefits in revising some of our habits of thought and practice, here is the opportunity for the psychiatrist

[2] Psychological Factors in the Choice of Medicine as a Profession, Part II, *Bull. Menn. Clinic, 21:* 99–106, 1957.

to begin to learn to communicate with nonpsychiatrists about his frame of reference and to learn to do so in a situation which may have a highly therapeutic result for the student.

Communication with administrators presupposes two conditions, however. The first is that the psychiatrist acknowledge his own lack of knowledge about the administrative end of the game. The second is that he check his professional jargon at the door and meet the Dean, or whoever it is, without this particular defense.

The greatest danger that the psychiatrist fears in such participation is that he will become known as an extension of the punitive administration, that he will find himself wearing two hats. Could this possibly be partly a reaction to an unfamiliar role, operating, that is, in other than a confidential, one-to-one relationship with an adolescent patient with the aim of contributing his understanding to someone else's decision about what the most constructive resolution of the difficulty would be?

There is considerable precedent for this dual role. Parents, whose adolescents have faith in their equity, have always combined these roles rather successfully. In the words of a once popular song, "It ain't whatcha do, it's the way thatcha do it." I think that we have all noticed that adolescents, when given the opportunity, can talk freely and often with a kind of honesty and clarity about themselves and others that is breath-taking. I have been particularly struck by the fact that, unlike adults, they will talk openly in the most unlikely circumstances. When sent for evaluation because of impending disciplinary action and warned that anything they say may be held against them, they do talk. When the disciplinary dust has settled again, some of them even return unbidden.

I presume that what takes place here is this; the student believes he will get a fair shake from the psychiatrist and therefore can trust him—trust him not only to evaluate fairly what is going on and take part in setting a fair punishment but also to see that it is equitably carried out. Perhaps it is only a delusion on the student's part that we operate for his best interest in the long run, but, as Masserman remarked some time ago, it is a delusion that one tampers with at one's peril.[3]

[3] J. H. Masserman, Faith and Delusion in Psychotherapy, *Am. J. Psychiatry, 110:* 324–333, 1953.

If the campus psychiatrist behaves as if he were dealing with adults and uses only the therapeutic patterns he learned in relation to them, does he not overlook just those possibilities for constructive intervention which differentiate the maturing ego of the adolescent from that of the adult?[4] Understanding of this maturational group implies that we cannot practice the adult psychiatry we have been taught. Yet we seem not to notice that the adolescent asks for models and that these models must be flesh and blood adults, with standards and convictions, as well as Deans, teachers, housemothers, and psychiatrists. It seems to me that there is little danger in our wearing two hats provided the student clearly understands which is which. The challenge to the psychiatrist to lessen his isolation and increase his direct and indirect practice of preventive psychiatry is enormous.

Assuming that some of us recognize the necessity for conceptual changes in our campus psychiatric practice, let me carry the subject of communication in the service of preventive psychiatry one step further to the problem of the transfer student. On campus the transfer is the one student about whom the admissions office can exercise some freedom of choice. This is particularly important to the state university which must accept many or all resident high-school graduates into its freshman classes. Because of this freedom of choice admissions offices occasionally are called upon to justify their decisions when a transfer student works out badly, particularly when it is later learned that the student in question had already manifested at his previous school a long and psychiatrically significant history, which, however, did not happen to be relevant to his academic or disciplinary status and therefore never appeared on his transcript.

Both of the schools involved, as well as the student, are the losers in this situation. The schools obviously lose the hidden financial subsidy the student receives and also the good will of an individual and often a family (for state supported schools this is no small matter) and so on. But what about the student? Until he is identified on the new campus after the fact, he is free to continue his pattern of self-defeat and discouragement at his leisure.

[4] E. H. Erikson, The Problem of Ego Identity, *J. Am. Psychoanalyt. Assoc.*, *4:* 56–121, 1956.

Furthermore, the chance is pretty good that he either withdrew initially without talking to anyone about his difficulties or, if he did, that it was suggested to him that "this didn't seem to be the 'right' school in which to 'find' himself and perhaps he might try a year at X University." In any event, the administrator was probably as puzzled about what had happened as was the student himself at having it happen again.

The protests I imagine I hear at this point (that this doesn't happen on *our* campus any more) remind me that I may be in the position of the professor who upbraided his class about poor attendance. Very well, I grant you someone talks intelligently with a student before he withdraws. But what if he transfers: does the next school have any opportunity for constructive intervention if it should be necessary before the pattern is repeated? I do not think so, because at present there is no way of obtaining the necessary information, even through letters of recommendation from previous schools. Deans and faculty members usually also believe that a disturbed student is not hopeless and try to help him find another chance.

We have established no formal channels of communication between health services and admissions offices which can handle these matters, and yet here is an obvious place to practice preventive psychiatry. Admissions officers are also concerned about this problem. They look to us for leadership in developing patterns of communication in this area which will not violate medical confidentiality and which, by helping the individual transfer student, will also help them in their work of selection.[5]

When such a nationwide pattern of communication is established and the campus psychiatrist has learned how to communicate and work effectively with the educator toward the goals they have in common, I imagine the pattern this communication may take to be something like this: The student will talk with someone before he withdraws to sound out where the problem areas lie. If they are medical or psychiatric he will be referred to the health service for evaluation. This will give the psychiatrist an opportunity to obtain a great deal of information about the student and also to

[5] D. L. Farnsworth, *Mental Health in College and University* (Cambridge, Mass.: Harvard University Press, 1957).

help him to begin to think constructively about himself. At this time he can also be told what steps are necessary for readmission.

Suitable recommendations are sent to the Dean, and the withdrawal is completed administratively. With a medical withdrawal goes an automatic medical stop, or hold, on further registration until such time as the stop is removed by the health service after an adequate re-evaluation. So far this does not sound very new or different, but here the stop is entered permanently on the transcript as routinely as are academic and disciplinary notations. It is significantly different, however, in that it is not absolute and binding on other schools until cleared at the originating school. Rather, it serves only as a notification that the student in question has had medical problems, which in the past were severe enough to prevent him from functioning adequately on campus. The admissions office, receiving such a transcript, will request a re-evaluation of the situation by the health service. The psychiatrist, with the student's permission, collects the historical information from the previous school through routine medical channels, probably will see the student personally, and ultimately will submit his recommendations to the student and the admissions office. The student is probably admitted. If, in this re-evaluation, it appeared that he did not have a reasonably good chance of completing his educational goals without further difficulties, the psychiatrist is in an ideal situation to help him plan a more realistic course of action.

If such a plan were put into operation tomorrow I do not believe it would automatically guarantee academic and personal success to every transfer student, even though I do think it would be useful in preventing considerable wastage of human resources. Its major contribution might well be that it would force the campus psychiatrist to change his concepts about himself. Ultimately I believe he must: there will have to be effective communication between the campus psychiatrist and the educator, or the psychiatrist will be replaced by someone who can communicate and who can make use of the preventive psychiatric possibilities of the campus. Sooner or later the educator is going to hear about these possibilities.

Traumatic Heart Disease as an Athletic Injury*

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HEART disease is not ordinarily a consideration in athletic medicine except as a cause for restricting participation in certain competitive sports. With increased awareness of the possibility of injury to the heart by a blow on the anterior chest wall, all physicians interested in athletic medicine should be cognizant of cardiac trauma as a possible athletic injury, especially in the young age group in which the elasticity of the thoracic cage may allow a greater incidence of cardiac trauma due to the ease with which the chest may be compressed with resultant contusing of the heart. Each year fatalities are reported in contact sports, the etiology attributed in most cases to head injuries. With increased knowledge of the effects of cardiac trauma it is not unreasonable to assume that some of the deaths result from cardiac injury.

Myocardial contusions and traumatic pericardial lesions are often overlooked or unconsidered in chest injuries because the clinical findings and symptomology are transient and difficult to recognize. A careful examination of an athlete with a nonpenetrating chest injury should include a cardiac evaluation for trauma. Although the initial clinical findings may seem mild, the sequelae may be serious. Early recognition is imperative in those instances in which surgical correction is possible.

The pathology and symptomology as well as the clinical findings

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may vary according to the anatomical component of the heart that sustains the injury. For all practical purposes athletic injuries to the heart may be considered to involve the pericardium and/or the myocardium. It is worth while, however, to mention that cases have been reported in which death ensued after a blow on the chest, by a baseball for instance, in which necropsy produced no significant evidence of cardiac trauma. The cardiac death, perhaps, could be attributed to a cardiac standstill or ventricular fibrillation initiated by vagosympathetic responses or a disturbance of the neuromuscular conduction system. In such cases of cardiac standstill the physician should be equipped to perform a thoracotomy and cardiac massage as a life-saving measure.

Various traumatic changes have been observed in the pericardium varying from minor lacerations of the parietal pericardium to total rupture of the pericardial sac. Hemorrhage into the pericardial sac has been frequently observed. Traumatic hemorrhage into or contusion of the cardiac musculature may be either subepicardial, myocardial, or subendocardial in location. In cardiac trauma as an athletic injury, pericardial laceration or hemorrhage and myocardial contusions are the most common. The violence of the blow in athletic contests is not likely to be of the intensity, for instance, as that sustained in automobile accidents or other crushing injuries to the chest; therefore, total rupture or severe laceration of the pericardium is not apt to occur.

Pericardial trauma as a single lesion is not significant clinically unless complicated by pericardial hemorrhage. Usually it is overlooked or mistaken for pericarditis. The electrocardiogram will often demonstrate transient changes in the S-T segment and T-waves soon after the injury and thus aid in the recognition of pericardial injury.

Hemopericardium is a serious manifestation of injury to the pericardium, and the extent of bleeding governs the treatment to be employed. Obviously, if cardiac tamponade is present, pericardiocentesis should be performed. If clots cause pericardiocentesis to fail, or if the bleeding recurs, then surgical intervention and correction is indicated. Pericardial bleeding may be accompanied by serous effusion of a degree requiring pericardiocentesis, although smaller effusions may regress without clinical interference.

In those instances where the hemopericardium is of moderate amount and does not regress spontaneously, evacuation should be done to prevent constrictive pericarditis as an undesirable sequela. It is important to remind the physician that the complications of minor pericardial damage are often insidious; therefore, the injured athlete should have careful cardiac evaluation for at least two weeks.

Injury to the myocardium is a significant disease in the injured athlete, a disease many times masked by injury to other thoracic structures. The following case exemplifies this problem:

A twenty-five-year-old negro athlete sustained a blow on the anterior chest wall. He complained immediately of severe pain in the sternal area and pain with ordinary respiration. Physical examination revealed marked tenderness to palpation of the sternum. The patient was admitted to the hospital, where roentgen views of the sternum and ribs were negative for fracture. The lung views were negative for pulmonary disease. On the second day of hospitalization the patient developed a fever of 100.6 degrees and a pulse rate of 120, both of which persisted for about five days. His white blood count revealed a leukocytosis of nearly 22,000; the serum transaminase (SGO-T) was 156 units; the sedimentation rate was 46 mm. in one hour; and the electrocardiogram showed evidence of epicardial damage. A diagnosis of myocardial contusion was made, and a treatment of bed rest and analgesics was begun. His clinical course was uncomplicated and the patient became ambulatory in about three weeks. When last seen two months after his initial injury, his cardiac evaluation was completely negative except for minor unresolved changes in the electrocardiogram.

The symptoms and signs of myocardial contusion may be absent or extremely variable, often simulating the symptoms of acute myocardial infarction with respect to the pain and its radiation. In myocardial trauma pain may be absent, or there may be a latent period from the time of injury to the onset of pain. Other signs and symptoms of myocardial disease may or may not be present, but laboratory findings comparable to those in acute myocardial infarction from coronary artery disease are usually present, consisting of elevation of the sedimentation rate and the serum

transaminase, leukocytosis, and significant change in the electrocardiogram. The latter consists of conduction disturbances, arrhythmias, and QRS abnormalities as the more important changes; however, there may exist transient nonspecific changes in the S-T segment and T-waves. These transient changes should not be considered diagnostic of trauma to the myocardium without other supporting evidence, but should alert the physician to the possibility of cardiac trauma.

The treatment of myocardial contusion is not much different from the management of myocardial infarction from coronary artery disease. Healing is more rapid in the former; hence, ambulation may be started earlier in the illness. Rest must be allowed for sufficient healing, however, to prevent myocardial rupture and aneurysm as a complication. Oxygen and analgesics are indicated to control the pain. Anticoagulant therapy is contraindicated because of the danger of hemorrhage in the injured components of the heart.

To summarize, it is recommended that the physician who takes care of athletes be constantly aware of the possibility of cardiac trauma in contact sports where the athlete may sustain a forceful blow to the chest wall. The obvious symptoms of musculoskeletal injury may mask the underlying traumatic cardiac disease, the sequelae of which may be serious or even fatal.

Case Reports of the Cornell Infirmary and Clinic

Dr. Rachun: "The case for today's presentation is of interest primarily because of its rarity. I don't think we are likely to see this particular type of case again. Dr. Showacre says this is the first one he has seen, and you know how wide his experience is. It is of interest too, because, at least in its early manifestations, this particular entity can be utterly confusing. As I go on, I will tell you how the diagnosis eluded three doctors, two of whom were orthopedists, before the diagnosis dramatically came to light here.

"The subject of our discussion is a big, strapping nineteen-year-old football player who weighs about 220 pounds and has the dubious distinction of being my first patient of the football season. He was brought in from the football field on the morning of the first day of fall practice, complaining of severe pain in the left leg and inability to bear weight on it, no more than one-half hour after he left the locker room.

"From his history it was obvious that this climactic episode was simply a culmination of a disability that actually had its origin about mid-July. It was about this time that he started his individual conditioning work for varsity football. He began by running about two or three miles a day. At the end of this stint he took light calisthenics and concluded with some vigorous hard running in place for a minute or two to speed up his leg action. After about a week of this, he began to develop pain in his left leg just below the knee. It was a dull ache, not troublesome at first; but as the days progressed, it became worse and more persistent. In the morning he had virtually no pain and had a negligible amount during the day, but shortly after he started to run it began

to ache, and at the end of the session it was worse and ached for the remainder of the day. This pattern—improvement with rest, aggravation with exercise—persisted.

"He finally saw his family physician, who felt that the young man had a strain or a sprain and advised him to take it easy for a few days. At the end of this time he returned to his running activities, and to his chagrin the pain recurred and now was worse, both more persistent and more severe.

"Finally, he reached a point at which the pain was present most of the time, so he sought the advice of an orthopedist, who after examination had the leg x-rayed. The x-rays were negative, and the physical findings inconclusive. No definite diagnosis was made, and rest was again advised. However, symptoms recurred when he resumed his training after a week of inactivity.

"Another orthopedic consultation was obtained. The orthopedist examined this boy carefully and found a certain amount of swelling and tenderness of the upper tibia, reviewed the x-ray films, and made a tentative diagnosis of a hemorrhagic ailment or perhaps an early inflammatory lesion, and he recommended that the boy come up here to Cornell in time for football sessions and put himself under my care.

"Shortly after putting on his uniform upon arriving here about two weeks later, he dashed out to the football field and drove hard against the blocking dummy. He felt a sharp pain in the upper part of his tibia and collapsed. He tried to get up but the pain was too intense. He was brought into the field house on a stretcher.

"When I examined him no gross deformity was present. He had a considerable amount of tenderness in the upper part of his tibia, bony localization being definitely established. In addition there was an area of swelling of about a palm's width in the area of tenderness and sharp upward percussion on the calcaneus evinced an unmistakable reaction of pain. At this time it was felt that further x-rays were indicated, and I think Dr. Showacre has a sequence of unusual x-ray films to present."

Dr. Showacre: "These films show, if you look closely, a low periosteal proliferation and a little reaction alongside the bone about three inches below the tibial plafond, and the next film also shows the same thing. If you are close enough, you can see a

zig-zag line through the cortex, and you can make out a faint black line going across the bone. This picture is characteristic of stress fracture, and this is an unusual stress fracture involving the upper tibia.

"We have the films from New York that were taken previously, and as we go over these with magnification we can't find any evidence of this lesion. In checking the literature we found that in the reported cases the lesion occurred characteristically at the same level, in the tibia about three inches below the tibial plafond."

Dr. Rachun: I'll finish my discussion by first of all commenting on the history of this case. I went into the history in some detail because actually, if you study it carefully, you will see the diagnosis is right there. Now I say this because, while we haven't seen a patient with a stress fracture of the tibia before, we have seen several cases of stress fractures of the lower end of the fibula. In fact, we see one or two of these almost every year, usually in track men. The typical history is much as I have recited it in this case. The onset is usually insidious, pain coming on gradually. With rest there is improvement and often complete remission. The pain increases with increased running and is usually at its worst for an hour or so immediately after cessation of running. I am laboring this point only because I wish to emphasize it. An additional fine point is that with deceleration in running the pain is magnified. Actually, on the basis of this patient's characteristic history he was referred to the x-ray department with a provisional diagnosis of stress fracture of the tibia in spite of the recent negative x-ray report.

"The second point, leading from this last remark, is that it usually takes two to four weeks from the onset of symptoms before x-ray changes typical of stress fracture appear. It is obvious, then, that if the first x-ray films taken during the first few weeks of symptoms reveal no pathology then repeat films must be taken at a later date. In our case a difference of two weeks was sufficient to reveal the pathology by x-ray. A definitive diagnosis, I believe, is important in a case of this type in a football player because there is some danger that this boy might have fractured the tibia clean through, and the resulting disability would have been much greater.

"The treatment was simple: crutches for a week, a cane for another week, limited activity allowed, wearing an elastic bandage when up and about. His pain regressed rapidly, and he had no trouble getting about the campus without discomfort. If the next series of films shows further healing, he will be allowed to participate in track. He is a weight-thrower."

Dr. Showacre: "These are the later films. This one was taken one month later, October 1. Now you have no trouble seeing the periosteal proliferation and callus formation. And we have another film taken November 10. As you can see, the callus is much denser and much more organized than it was on the previous film, also much greater in extent.

I should like to re-emphasize what Dr. Rachun has said again in regard to stress fractures that an x-ray will not reveal them in their initial stages. We depend upon absorption, the first stage of healing, to make the fracture line visible, or else we depend upon beginning callus formation, and these take from two to four weeks to develop. Remember, if symptoms are persistent and have the characteristics that Dr. Rachun described, x-ray examination should be repeated in about three weeks."

Dr. Fryer: "I would like to know something about the nature of the stress which you think may have caused this in the first place and can this happen in bone which is entirely normal prior to the stress? This is a pretty sturdy bone, isn't it?"

Dr. Rachun: "I'm glad you asked that because I did want to add one additional point to what I have already said. This boy gives a past history of having fractured both wrists at one time. This may or may not have any bearing on the fragility of his bones.

"However, more important is this history. In March 1957 he was treated for an osteochondritis dissecans of the talus of the ankle by a nonweight-bearing cast and crutches for two and a half months—that was from early March to mid-May. I have wondered whether this enforced rest to the leg with consequent atrophy of tissues might have contributed to the development of the fracture. There are other reported cases in the literature which have followed a similar pattern.

"The actual cause of stress fractures, as you probably know, is not definitely known. All that is known is that they do occur in

definite locations, the metatarsals being the most commonly afflicted, followed next in order by the lower end of the fibula; but actually there are very few long bones that are immune to stress fracture. They are known to occur in the humerus, the clavicle, and even in the pubic rami.

"Parachute jumpers during the Second World War were known to have a characteristic stress fracture of the upper fibula. In Germany they used to have an army exercise which consisted of squatting and jumping, and numerous stress fractures resulted from these squat-jump activities.

"No consistent factor, be it chemical, metabolic, or mechanical has been found to explain the development of this lesion. We have seen about a dozen cases of stress fracture of the lower end of the fibula, and we have looked for some clinical common denominator in all these cases. Practically all of them were track men. The fractures seem to occur mostly when the athletes run on the boards. I have not seen any cross-country men with this involvement, although they do occur in this group too. The fracture of the lower fibula is characteristically located about two inches above the tip of the fibular malleolus. I have noted that in at least half the cases there was some pes planus. Some authors believe this is a factor in producing this fracture, but I think this is oversimplifying it. On the other hand, there is no doubt that a short first metatarsal predisposes to stress fracture of the second metatarsal, as we do see this combination often enough."

Dr. Fryer: "Do people who have had one stress fracture tend to get a return?"

Dr. Rachun: "We have on record two cases involving successively a stress fracture of the metatarsal and a stress fracture of the lower end of the fibula within a period of about two years."

Dr. Fryer: "If I am right, the fibula is not a weight-bearing bone so is there any thinking that this might be, as it were, a jarring phenomenon rather than something to do with direct transmission of physical stress?"

Dr. Rachun: "The fracture perhaps could be likened to the jarring effect on the masonry of a building with trucks rumbling by day after day. The masonry would eventually start to crack. It is possible that a stress fracture behaves in the same way, the

jarring in this instance being produced by running or walking on hard surfaces. Unco-ordinated muscular action, the result of fatigue, also may play an indirect role. Again, this may be oversimplifying the problem, but it has been a common factor in our track men. I have never seen a stress fracture go on to complete fracture, although Dr. Showacre does know of one case of a track man in which this happened several years ago."

Dr. Showacre: "Yes, this boy had a stress fracture which apparently wasn't recognized at the time, but he had the characteristic symptoms for about a month. The trainer took care of him and kept his foot taped during practice. You know something about the track meets in Barton Hall; the curves are not banked. The boy started out fast, and when he hit the first curve he went right off the track and hit the floor and rolled over. There he was with his foot in his hand. He had a complete fracture of the metatarsal with slight separation of the fragments. So, he evidently had a stress fracture to begin with and intense leverage on the curve broke the bone in his foot."

Dr. Rachun: "An interesting thing about some of these cases is that occasionally the swelling is misdiagnosed as a tumor of some kind, and there is at least one case on record in which radical surgery was done because of the suspicion that sarcoma was present."

Dr. Godfrey: "Did you think at any time that this was a pathological fracture?"

Dr. Rachun: "No, I didn't because of the clinical picture as I described it in detail. In my limited experience with pathological fractures in this age group—usually due to a cyst of the bone—the fractures are dramatic, occurring suddenly without gradually increasing symptoms as in this case. I recall one in a baseball pitcher. He tried to pick somebody off first base and threw the ball into the stands, and his arm almost went with the ball as it fractured through a cyst of the humerus."

Dr. Fryer: "You would certainly expect to see something on the first x-ray if this were a pathological fracture."

Dr. Showacre: "In a pathological fracture the underlying pathology generally is evident. I think the tip-off is a single incident and sometimes a trivial incident. A single trivial incident, that's

what makes you suspect pathological fracture. The x-ray can usually tell you the story. Incidentally, here at Cornell when that happens, it is almost invariably a large bone cyst. Of course, there are other reasons: you might have a malignancy; you might have a variety of bone diseases; but among the students here almost all of the pathological fractures are due to a bone cyst. I recall one pathological fracture of the clavicle. A bone cyst was involved. The boy did a little flip-flop while tumbling and felt a loud crack. The x-rays showed that he had only a little cortex left in the clavicle at the site of the cyst.

"Also, there is a kind of pathological fracture in which the x-ray itself doesn't show anything. That is a radiation fracture. Radioactive materials may be taken up so that the bone is loaded up, and some years later a pathological fracture occurs. If that bone is examined by x-ray, it does not show evidence of bone disease. Sometimes fractures follow radiation therapy, and I have seen multiple pathological fractures of a bone showing no evident disease. Apparently radiation in excess weakens the bone somehow.

"Returning to the common stress fracture, I can recall a number of them that were bilateral. A metatarsal bone may be involved in one foot, and a couple of years later the same bone in the other foot may fracture. One boy had bilateral stress fractures of the fibula occurring at different times. When we consider the rarity of stress fractures in the population, the number of patients who have had more than one stress fracture is inordinately high. Perhaps there is some latent biological difference which has defied detection."

Dr. Fryer: "It seems to me that in a population where we have so many athletes constantly imposing heavy stresses on their osseomuscular systems that there must be a bony difference in the few cases that develop the lesion."

Dr. Rachun: "In the present state of our knowledge, this hypothesis is a reasonable one."